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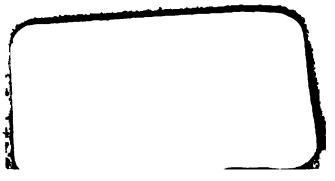

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SAFETY ENGINEERING

"THE MAGAZINE OF SAFETY"

VOLUME XXXVIII

JULY-DECEMBER, 1919

NEW YORK
THE SAFETY PRESS, Inc.
1919

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SAFETY ENGINEERING

Vol. 38 JULY, 1919 No. 1

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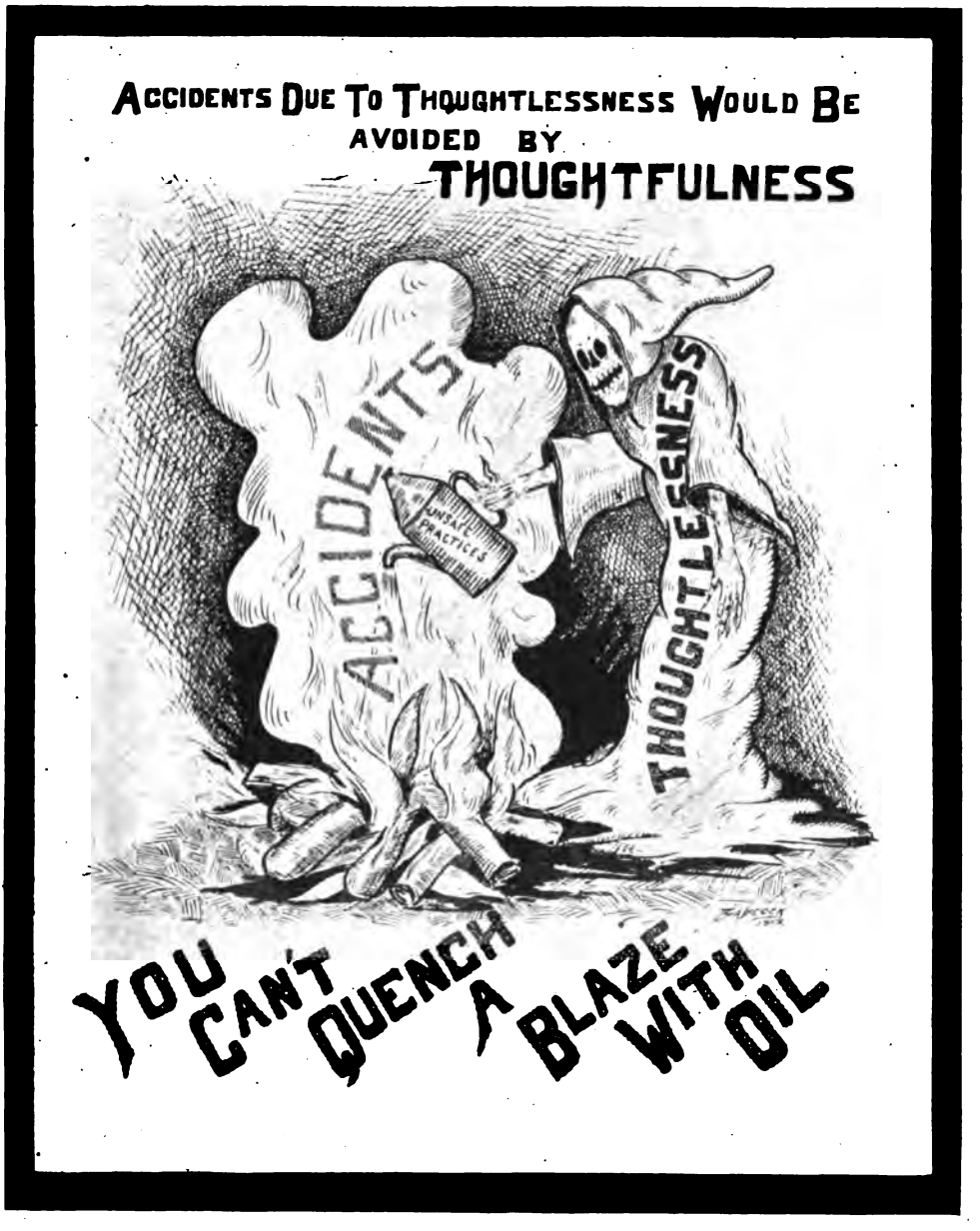
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Kerosene Lamp Explosions

By C. E. Worthington

KEROSENE lamps explode. At least such is the popular tradition and conviction, based upon extensive evidence, credible and incredible—mostly incredible—but, on the whole, too profuse to be wholly discredited. So we may assume the fact.

If, however, we accept what we ordinarily understand an explosion to mean, viz., the disintegration and expansive conversion of all or a part of the contents of a receptacle, and its forcible disruption thereby destroying instantaneously the receptacle and scattering any remnant of its contents broadcast and without warning, actual lamp explosions are extremely rare.

Kerosene does not explode; it cannot be exploded by concussion, detonation or application of fire so long as it remains a liquid. Explosion is simply extremely rapid combustion, an operation requiring the distributed presence of large volumes of oxygen, and kerosene contains no oxygen whatever. The vapor of kerosene, which is merely kerosene very finely divided, when evenly mixed with air (which is largely composed of oxygen), will explode violently for the same reason.

Hence, it is possible to explode a lamp or other receptacle containing kerosene under certain conditions; but there are several conditions to be fulfilled, and the several must be present and act concurrently, and they are all fairly well guarded against; and, although one or even two of the requisite conditions may exist simultaneously, it is not sufficient unless all are coincidently present.

What generally passes in common parlance as a lamp explosion would more properly be termed a "flare." In this case the flame seems to gain suddenly and emit smoke; then follow the breaking of the chimney and considerable yellow flame, with much dense black smoke, which has the effect by reflection of making the blaze appear much larger than it really is. Wherever this smoke condenses it leaves a thick deposit of oily, unconsumed carbon, or "lampblack."

Ordinarily, if let alone, this will burn itself out without any special injury to the lamp beyond the distortion of the metal burner parts, but the appearance is far too threatening and the damage inflicted by the smoke usually too great for considering such a course; and there is also a chance of resulting fire damage from breaking of the lamp by heat thus permitting the oil to escape and ignite (not explode), so an immediate attempt to remove the lamp to some place where neither smoke nor burning oil will be dangerous is at once undertaken.

It takes much courage and good nerves to attempt to remove the lamp with the threatening blaze, especially if one is previously impressed with the idea of imminent explosion—exactly as much as though explosion was really imminent; and there is a little real danger that in moving it the flame may be blown against the lamp and crack it, letting oil run out and ignite. So, usually, the operation of removal, which should be done with care and deliberation, is done in haste and trepidation, resulting often in overturning, dropping or breaking the lamp with more or less serious results. This is not explosion, but about all of the "explosions" reported in the press turn out on investigation to have been really flares.

The flare is bad enough, and there must exist some good reasons for its occurrence, as well as the actual explosion which comes sometimes, either in the construction of the lamp or its care, and some palliatives if not complete remedies.

KEROSENE

A little preliminary understanding of what kerosene is and of its qualities is necessary at the outset.

Kerosene is the name applied to the illuminating oil content of petroleum. It must not be confused with coal oil, which

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is an entirely different product, derived from the destructive distillation of certain shales. Coal oil is similar in many respects, but quite dissimilar to kerosene in others, and is not now, and has not been for many years past, a commercial product to any appreciable extent. It would be a matter of great difficulty, if possible, to purchase even one gallon of coal oil; so for present purposes that material may be wholly disregarded.*

Kerosene is produced from petroleum by distillation under heat and pressure, which break up or "crack" the petroleum. The lighter products first drawn off and condensed are extremely volatile and also very combustible. Rhigolene, or petroleum ether, the lightest of these, will boil from the heat of the hand, but the next grades, known as gasoline or naphtha, are more familiar, all volatile and give off vapors at very low temperatures that become explosive when mixed with air. These vapors are nearly three times as heavy as air and do not very readily mix with air. They are highly explosive when mixed with about 2.5 per cent of their volume of air, and the explosibility ceases before 9 per cent admixture is reached.

The next lot of vapors to come over are condensed into illuminating oil. This oil is heated with acid to remove certain impurities, the acid remaining neutralized by use of alkalies and the product thoroughly washed. The nearly colorless oil procured by this process is known as kerosene.

Kerosene is a comparatively modern product, produced commercially for the first time by the United States Chemical Manufacturing Company in Waltham, Mass., about 1851. It met with little sale for several years, but upon the discovery of oil in Pennsylvania its production was cheapened and its use extended rapidly. Before this, coal oil was used to some extent, although in some disfavor because of what was termed "explosibility"; also camphene (a strict synonym for spirits of turpentine) and "burning fluid," which was a 50 per cent compound of camphene and grain alcohol, all of which followed candles, sperm oil and lard oil for illuminants. Many persons now barely past middle age can doubtless recall to some extent the use of all of these.

Kerosene is a very complex substance. Chemically it is a hydrocarbon oil and chiefly composed of hydrogen and carbon, but it contains no free oxygen. The carbon, however, is not a single form, but a considerable variety of forms, some uniting readily with oxygen, some requiring extremely high heat for such union. These "non-volatile carbons" are not present in any large volume, but, as we shall see later, the small proportion that does exist is material to the hazards of use.

All substances when heated to a certain point give off vapors, that is to say, they begin to break up and throw off superficially very minute atoms of their substance, both gaseous and solid. This, in general, is near the boiling point, but in what are termed "volatiles" it is much below—sometimes far below any ascertained natural temperature. Many naphthas, for instance, give off these vapors in dangerous quantities at —40° F.

The point at which the vapors, if brought in contact with flame, will flash back and ignite the main substance is called the flash-point. This is well within control of the manufacturer of illuminating oils, and there is a rule of legislation determining the point at which they can be legally sold. Generally the "legal test" or flash-point of kerosene is between 100° and 105° F., usually the former. That is, the fluid must be warmed to that point before giving off explosive vapors in dangerous volume.

They do give off vapor at lower temperatures but slowly, so slowly that no dangerous accumulation ordinarily occurs. A small confined space may be filled, but if once ventilated considerable time is required to renew it, and very slight ventilation suffices.

The vapor of kerosene is, to all practical intents and purposes, identical with naphtha vapor, having about the same explosive qualities, with about the same admixtures of air, only differing substantially in the temperature required to produce it.

*Note—In some districts the name coal oil still persists and is used almost exclusively as applied to illuminating oil instead of kerosene.

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Kerosene in bulk burns in the air superficially and only by the conversion of the surface to vapor. It burns in a mass with a dull yellow flame, much dense black smoke (unconsumed carbon —lampblack) and comparatively little heat. When vaporized or sprayed, so as to insure a sufficient supply of oxygen, it burns with a pale blue flame with little light, and high heat.

As used directly for illuminating purposes the supply of oxygen must be so regulated as to heat the carbon particles white hot, but not destroy them, since it is simply from the incandescence of these particles (given off as lampblack in the instance first quoted) that light is obtained. Thus, in indirect proportion to the oxygen mixture and heat of combustion, the flame is dull yellow (little light), bright yellow (fair light—ordinary), white (maximum obtainable), pale blue (complete combustion—little light). This will serve to explain the differing results obtained by different burners from the same oil.

THE THEORY OF THE LAMP

All portable apparatus burning kerosene oil for illuminating purposes is based upon the proposition of bringing the oil continuously in small quantity to the point of combustion and vaporizing it at that point, at the same time supplying, generally by a forced or induced draft, exactly enough air to produce the maximum heat of combustion possible without destroying the carbon particles. If the flame is too hot or not hot enough the result is similar, but the light is diminished.

TYPES OF BURNERS

These may be divided into four general classes: Flat wick, round wick, tubular wick and pressure burners. The last-named system for portable lights is practically obsolete and need not be discussed here, although sometimes found in use for stationary apparatus on a large scale for lighting stores and factories. These "pressure systems" operate generally on the plan of complete combustion, obtaining light by means of incandescent mantles, and oil is generally distributed by compressed air pressure

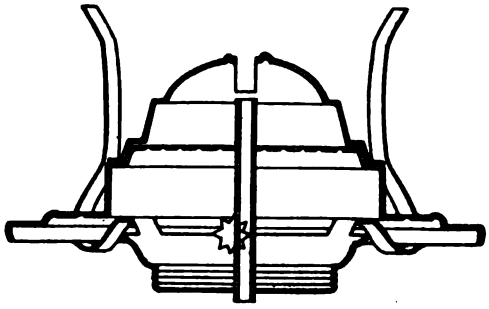

Fig. 1—Bisected burner (open) showing cup about base of tube

from a tank or reservoir, more rarely by gravity, the general operation being upon the same principle as that of the "blue flame," wickless kerosene stove.

FLAT WICK BURNERS

This is the type most frequently found in common or household use, and its construction in the commoner and cheaper forms is well shown in Fig. 1 of a bisected burner of this class taken from a lamp that flared, or, as reported in the daily papers, "exploded." (Fig. 2.) This is made of sheet brass, and the general plan is quite simple, consisting primarily of a saucer-like base threaded to screw into a socket attached to the font, or oil receptacle, through which extends a flat tube for the passage of the wick. This tube, ordinarily about 1½ inches long, extends slightly below the bottom of the "saucer."

Approximately an inch above this is a second "saucer," this time inverted and having the bottom and outer rim coarsely perforated (the bottom is, of course, the top when in an inverted po-

Fig. 2. Burner of ordinary type (closed)

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Fig. 3. Burner of ordinary type (open)

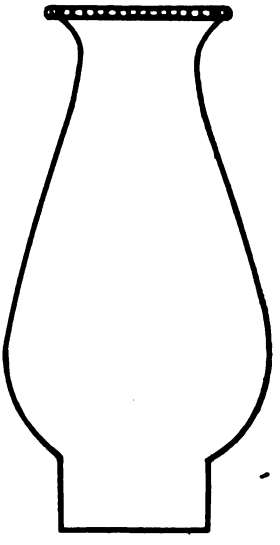
sition). The edges of this "saucer" extend slightly below the top of the lower one, the difference in diameter affording an open space of about ¼ of an inch. This also fits closely to the wick tube.

In the space between the two "saucers" the wick tube is slotted in two places to permit the entrance of two small spurred wheels on a stem, the revolving of which operates to raise or lower the wick, the slots exposing the wick. (It is from ignition of the exposed wick at this point that the most trouble comes.) From the edge of the bottom saucer there generally extend four spring arms, to hold the chimney in position, curving outward and upward. Upon the upper "saucer" and just exceeding the perforated plate in diameter is superimposed a curved metal cap, frequently hinged, slotted above the wick tube, the slot being just a little larger than the tube and perhaps 2-16 of an inch above it.

The function of the wick is, of course, to take up the oil continuously by capillary attraction, that unexplained force which causes fluids to rise in small tubes or spaces against gravity.

The space about the lower "saucer" is to permit free entrance of air; the upper plate is perforated to permit air to pass through it freely and yet, to some extent at least, to shield the lower saucer from accumulations of dust and drippings.

The duty of the curved cap is to concentrate the air supply at the point just above the end of the wick, the underlying idea being to provide a point of ignition just far enough above the wick to heat the upcoming oil to the point of vaporization and yet far enough away to avoid consuming the wick. To do this exactly is, of course, impracticable, but all burners do approximate it. The upward draft is induced by means of a chimney, usually of glass, with a straight tubular base to fit between the spring arms and often bulging opposite the flame to avoid cracking from heat. These chimneys vary greatly in shape, according to the whims of the maker.



Lamp chimney

When a match is applied to the top of the wick and held there long enough to vaporize a little of the oil, it ignites and burns with a yellow flame and much smoke, but upon placing the chimney in position and increasing the air supply the flame becomes clearer and nearly smokeless. The draft increases as the chimney heats, generally calling for some regulation of the wick soon after lighting. With a clean lamp and properly trimmed wick there is practically no fire hazard so long as the lamp itself remains intact and the height of the wick is properly regulated.

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THE FIRE AND "EXPLOSION" HAZARD

The hazards may be completely summed up in two terms, carelessness and neglect of cleaning and trimming, and carelessness, apart from leaving or placing a lamp where it may be easily overturned or broken, in the not uncommon practice of keeping lamps where the temperature is above the normal—for instance, on a shelf back of and above the kitchen range or cook stove.

Kerosene of legal test of 100° F. begins to give off explosive vapor in considerable volume when heated to that point.

The average temperature of an ordinary room may be set at 70° F., so that the hazard of vaporization begins to be serious at a point only 30° above the normal. When the lamp is lighted the chimney and burner are speedily heated, and the whole body of the lamp, contents included, is slowly heated by conduction. So, in any event, in a lamp that has been burning for some time the temperature is above the normal, and a good deal depends upon the starting point of this increase. If a lamp of 70° temperature will heat to 85° in 4 hours it will be clear that if the same increase applied to a lamp of 90° temperature the danger point will be passed within that period. The slow heating of the lamp is inescapable. Of course, the burner heats more rapidly than the lamp.

By examining the cuts it will be readily seen that the projection of the rim of the inverted "saucer" below the top of the lower one makes the interior and bottom of the lower entirely invisible from any angle of vision. Possibly this projection was intended to serve to some extent as a shield from dust, but its main function is sightliness, concealment of the unsightly "saucer" and slotted wick tube, since dust is freely drawn in about the open edge. (Fig. 1.)

The perforated plate does some duty as a fire guard as long as it is cool enough, but the perforations are coarse, and when the plate is heated it affords but a slight barrier (even fine gauze ceases to be effective when sufficiently heated); the perforations moreover are large enough to permit small pieces of charred wick to pass through.

This "saucer," invisible and uncleanable by ordinary means, serves to collect dust, a process aided by the draft of the flame, charred fragments and more or less oil which necessarily comes through the slots in the wick tube or works down from above. The latter is largely avoidable, the former not.

When there is any material accumulation here—and there usually is in an old or much used lamp—as soon as the temperature reaches 100° in the brass burner explosive vapors are emitted and, if the perforated plate is hot enough, will reach the flame and may flash back; probably under some extreme conditions they pass outside and ignite. The ignition of a very little of this highly combustible accumulation serves to set fire to the exposed wick in the slot (whoever has tried to turn down a flaring lamp may have noticed that it cannot be done, the reason being expansion and distortion of the stem carrying the spurred wheels by heat); this fire in the "saucer" consumes all or about all of the oxygen which should reach the top of the wick, and imperfect combustion, yellow flame and much smoke result, then the chimney cracks and falls away. This is why a lamp left burning for a long period flares, but the same result may be brought about by blowing down the chimney, thus forcing flame through the perforated plate and igniting vapor or material below it, or by a strong draft.

The lamp in this deadly quality somewhat resembles a rattlesnake; it customarily gives ample preliminary warning by beginning, in household phraseology, to "smell." Unpleasant odor in a lamp when lighted is prima facie evidence of an unclean condition, with a probable location in the "saucer."

There is some hazard about the wick. The object of the burner is to keep the point of highest heat and combustion a little above the top of the wick.

But most of the carbon in kerosene after doing duty in the flame passes off in smoke, which is not visible when all goes well, but is there (its presence is readily detected by the dark rings on the

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ceiling above a permanent lamp or by holding a sheet of glass 8 inches or more, to avoid interrupting draft, above the chimney), and some forms that are not vaporized except in a forced draft of air. The result is that during the brief period which must elapse between applying the match and putting on the chimney a little crust is formed on the top of the wick. This requires the turning up of the wick to bring it into proper relative position to the draft, and brings the top near enough to the combustion center to actually char, sufficiently complete combustion being prevented by the deposit mentioned.

The higher the wick is turned the more of the sides are exposed, and since the flame is brought into more complete contact with the parts of the burner less affected by the ordinary draft the more rapidly and completely the burner heats; hence, the complete removal of this "char" before lighting is imperative.

The exact sequence of conditions and events leading up to an actual explosion is a matter of some doubt, but it is certain that low oil and a correspondingly large vapor space are prime factors, since only the vapor is explosive.

Further, a certain admixture of air is necessary to produce an explosion, and just how the air enters the font is not always clear. There is a very little space about the wick in the tube, and possibly enough air can filter in, but general observation suggests that the small flat tube often found alongside of the wick tube may be largely responsible. Just what function was contemplated in this tube is hardly clear, certainly not to relieve vapor pressure, for the tensile resistance of a hollow receptacle is too considerable to be overcome by ordinary vaporization. It would, of course, be possible to rupture a font, either of glass or metal, if the contents were sufficiently heated and enough time was given, but the first of these conditions is never present, so ventilation is needless; while there is every reason to suppose that the tube lets in some air, 2 per cent to 8 per cent is plenty to assure violent explosion if ignited, but unless there is this proportion of air there can be no explosion.

This tube cannot in any manner contribute to flares, but if hot enough it might permit the passage of flame to the font. Tubes, gauze and perforated plates protect by absorbing heat, and when sufficiently heated themselves they entirely cease to function.

The brass bottom of the lower "saucer" and the wick tube which projects slightly into the font are of very thin brass and heat quickly, and it is not merely conceivable but probable that in event of a continued flare they get hot enough to ignite vapor within the lamp when it contains enough air mixture to be ignitable. This, in general, is the most plausible suggestion, but the explosion, when it occurs, destroys all evidence. A loose socket or a cracked font may produce like results, but this is quite improbable.

The flat tube mentioned is apparently wrong in principle and superfluous. It seemingly is capable of letting in air enough above the oil to produce an explosive mixture and, in case of an overturn of the lamp, provides an unobstructed avenue of outflow for the oil, which appears to be a definite hazard and detriment while no actually useful function is assignable to it. Statistical information on this point is unobtainable.

The type of burner described above is the one most generally in use; it is the very cheapest form, which perhaps ac-

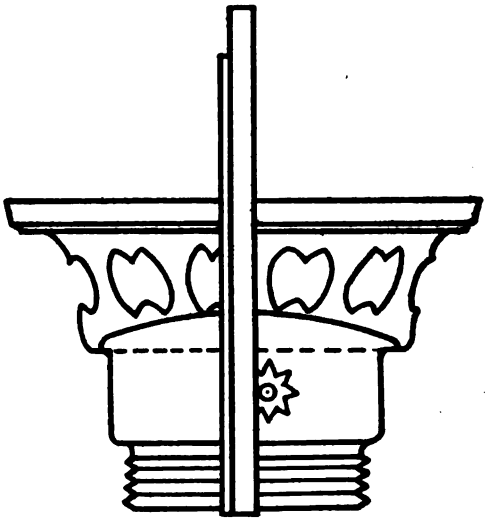

Fig. 4. Cross section showing closure about wick tube

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counts for its prevalence, and since concealment of the danger points is its special feature, it does not externally suggest any trouble in caring for it, which is perhaps another reason.

All flat tube burners do not possess these hazards in the same degree, some

Fig. 5a. Completely cleanable type (closed)

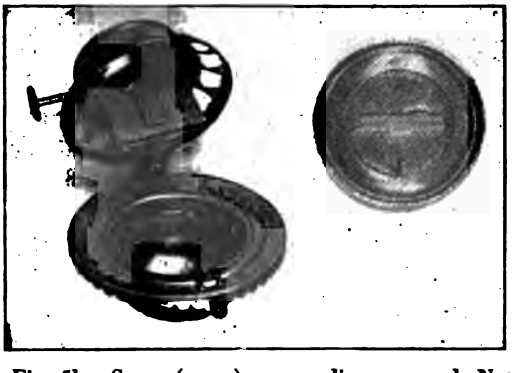

Fig. 5b. Same (open), gauze disc removed. Note handle on disc. Tube completely closed in

being completely cleanable and having the slotted part of the tube tightly enclosed. There are too many variations to illustrate them fully, but several typical forms will serve to show the progression.

It will be noticed, in examining the better forms of burners, that the hazard of accumulation and vaporization of oil, dust, etc., out of sight about the base of the wick tube, has been recognized by the burner makers and its elimination attempted, and a style of burner offered in which the space about the slots in the wick tube is entirely closed in, there being no opening internally through which oil and dust can accumulate about the chief danger point. (Figs. 4 5a and 5b.) In this burner, air is freely admitted below the perforated plate, which is more finely perforated than in Fig. 1. The perforated plate is, however, difficult to remove and replace, and, although the top of the curved space about the slots is visible, it is still a little difficult to clean. This burner, however,

Fig. 6a. A better type (closed)

Fig. 6b. Same (open) showing separable gauze disc

has the needless flat tube, but is a considerably safer one, as it reduces the chances of a flare.

A third typical form is shown in Figs. 6a and 6b. This form has the space about the slots in the tube completely closed, and is similar in all respects to Fig. 5, except that the perforated plate is readily removable (and consequently

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Fig. 7a. Double wick burner (closed)

replaceable if injured). The removal of the perforated plate, which simply lifts out by a small handle when the burner cap is thrown back, fully exposes every superficial part of the burner, so that it is easily and completely cleaned. This burner appears to embody the maximum of safety, and it is difficult to conceive how it could possibly originate a flare; the only apparent improvement being the omission of the extra flat tube. One form of this type of burner is sometimes sold under the trade name of "Sun burner."

More as an illustration of the numberless variations and devices, a cut of the double flat wick burner is appended. (Figs. 7a and 7b). In general details of closure of space about the tube slots, air supply and perforation this corresponds with Figs. 4 and 6, except that the perforated plate is not removable and there is the same trouble in cleaning as in Fig. 4.

The special features of this burner are a cap and chimney support which locks on by a quarter turn, assuring with reasonable care the stability of the chimney, and a device operated by a lever that closes upon the wicks and extinguishes the flame, so that the lamp need never be blown upon to extinguish it. The device is a good one, but, since no flame in this case can possibly be blown to a point where it can directly or indirectly ignite the wick in the slots of the tube, it is not of material value beyond convenience. Applied to type 1, it would be a very material safeguard, but it is much too costly to be so applied.

All of the flat wick burners offered for sale fall well within the types figured, and the comparative hazards are well shown by these.

ROUND BURNERS

This is the class under which falls the ordinary parlor lamp burner. The wick is a wide flat one and the wick tube a double cylinder, the edges of the wick being bent around to lie closely against a supporting rib which holds the two

Fig. 7b. Double wick burner (open)

parts of the wick tube in place. The apparatus is more complicated than the flat wick burner and usually comprises several separable parts. (Figs. 8a and 8b.)

This is a fairly typical burner of its class and a reasonably safe one, the space about the slots where the spurred wheels enter being completely closed in and the central space within the inner cylinder of the wick tube likewise sealed. This closure, however, forms a deep well in which large accumulations of oily dust and the like would be sure to occur and which is safeguarded against by dropping in an inner sealed tube open at the top and removable; in this case it is a shallow cup on the end of an upright rod.

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This can be lifted out, bringing with it any accumulations.

Severe flares occasionally occur in this type of burner, due probably in every case to ignorance of its construction or to poor care. There is no apparent possibility of a flare except from some accumulations in this central well. It is, on the whole, far less dangerous than the flat wick burner in Fig. 1.

There is another type of round burner in which the central well is closed, but there is no removable cup or plunge provided. This permits considerable accumulation at a point not visible and quite difficult to clean, and, as might be expected, is fairly productive of flares. The type is one to avoid in purchasing. In general, the round burners fall well within the limits of the two types given.

Fig. 8a. Round wick type (closed). Parlor lamp

TUBULAR WICK BURNERS

This class is practically obsolete, but may be found occasionally; one burner of this sort is offered for sale (no sales recorded) in one of the leading stores, although viewed by them with much distrust. It is in many parts quite complicated, "fearfully and wonderfully made." (See Figs. 9a and 9b.)

This burner contains the usual central well, closed at bottom but thinly slotted on two sides. The stem passes through this well (it is outside of it in the round burners figured), and the actuating wheel is within it, the spurs engaging perforations in a sliding upright of bent metal, the edges of which pass through the slots and raise or lower a close fitting collar with small toothed projections. The wick is tubular and placed over the outside of the tube; there is a round hole, seemingly for drainage, in the bottom of the well. There is no safeguard whatever against accumulations in this well unless the perforation will serve to drain off some of the oil; it is hard to examine, requiring the entire apparatus to be first taken apart, and when set up there is *a continuous open space reaching from the flame to the oil* only loosely obstructed by the wick. The device apparently embodies many points of hazard, but is so expensive and complicated that any extensive sale or use is doubtful, so that practically it may be ignored, being shown merely to indicate what can be done and sometimes is done.

GENERAL CONCLUSIONS

The general conclusions reached upon rather extended personal experience and investigation and all data obtainable are:

(1) *Lack of cleanliness* is chiefly responsible, but this is not so much a personal matter as one arising from ignorance of the construction of burners, the nature of kerosene and the use of burners which provide facilities for invisible accumulation and are difficult to clean.

(2) *Carelessness,* such as keeping lamps in warm places, permitting the oil

Fig. 8b. Same dissembled. Note cup and plunger for central well (inverted in cut)

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to run low and the like, and careless trimming. Ignorance of fundamental facts and principles, rather than sheer laziness, probably accounts for this in the main.

(3) *Poor choice of burners.* Once more ignorance, and a false sense of economy. A safe burner costs a little, a very little, more than a comparatively safe one, but to the purchaser a burner

Fig. 9a. Tubular wick burner (closed)

is simply a burner, and so long as it will consume oil and produce a light they all seem alike and the very cheapest as good as the best. It is to the credit of many shopkeepers that, where they have knowledge themselves, they advise and urge the purchase of safer types, although handicapped by the higher price and the resulting suspicion that their advice is based upon a prospect of greater profit.

REMEDIES

The principal remedy is, of course, educational propaganda, but a few suggestions are in order, viz.:

(1) Do not buy and use burners that are hard to clean.

(2) Become familiar with the construction of the burner and its hazardous features.

(3) Keep strictly clean all points where oil and char can accumulate. If a burner of any type begins to give off an unpleasant odor ("to smell"), remove it from the lamp; take out the wick and boil the burner hard for 30 minutes or more in a strong solution of baking or washing soda; shake it about well in the soda and rinse clean in hot water. *This should invariably be done* in Type 1.

(4) Keep wicks well trimmed, and never let oil get low. If the wick fouls and needs to be turned up high, it is better to extinguish the lamp and trim the wick. A wick in a well kept lamp should last a long time and char but a little at the top. Excessive charring indicates that something is wrong. Obstruction of the perforated plates or enough refuse about the base of the wick tube to produce any considerable volume

Fig. 9b. Tubular wick burner dissembled

of vapor will reduce the draft and cause smoking and charring.

(5) If needful to leave a lighted lamp unattended, it is better to use a fresh lamp, one that has not been in use within several hours and is clean throughout, properly trimmed and full. For this purpose a glass font may be preferable, *provided* it is one not easily overturned and it is safely protected from injury.

(6) Do not blow down the chimney in extinguishing a lamp. Blowing down

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involves serious hazard. Blow across the top, first turning the wick low.

(7) Do not mount bracket lamps in such a position that they can be swung under shelves or curtains or into contact with them. Be certain, in case of suspended or swinging lamps, that they are securely supported by strong incombustible supports arranged to minimize the "swing" of the lamp. (The number of such lamps found supported by string or twine is surprising.)

(8) Do not place or hang lamps in strong drafts.

(9) Keep the wick turned down just below the top of the tube while unlighted.

GLASS VS. METAL LAMPS

There are so many points of excellence in glass lamps as compared with metal that it is difficult to condemn them wholly. Glass is transparent, and the level of the oil is always determinable by sight. Glass is a non-conductor of heat, and the increase of temperature in the oil is consequently much retarded—an important feature, since in possible explosions one of the two determining features is the temperature of the oil. They are also easier to clean than metal.

Their defects are, first, the liability to breakage if upset or struck; this defect has been somewhat exaggerated, since if any lamp is upset oil is likely to run out into the burner, especially if there is an auxiliary open tube in the burner to deliver the escaping oil, directly upon the flame. Glass lamps are subject to another objection, in that the collar or socket into which the burner screws has a tendency to work loose. This is due to the different rates of expansion of glass and metal, and is to some extent unavoidable, although latterly fairly elastic cements have been used that greatly reduce the tendency.

The general difficulty in determining the height of oil and the greater tendency to heat are the unfavorable features of metal lamps. These cannot be overcome.

The ideal lamp is a glass font protected by metal externally to prevent breakage, but a well balanced glass lamp appears to have preponderating desirable features for household use. Tall glass lamps or those on narrow bases or topheavy should never be purchased or used, no matter how much their design appeals to the purchaser's sense of beauty. Safety should take precedence.

The extended use of coal gas, electricity and acetylene has made great inroads upon the popularity of the kerosene lamp, and a further decrease is to be expected, especially if kerosene advances greatly in price. Modern methods of distillation are directed to increased gasoline production and a decreased output of kerosene, which may prove a factor.

It is not at all improbable that the demand for gasoline may result in renewed distillation of shales on a large scale and coal oil again become a commercial product. This would introduce some new problems, which, however, need not be considered at present.

SOME OBSOLETE TYPES

Several types of burner distinct in principle from those illustrated have attained considerable popularity at different times. One of these was a metal lamp of hollow construction carrying a flatwick burner. This lamp used no chimney, the necessary draft being forced by a clockwork operated fan in the base. This lamp produced a very white light, probably very close to the maximum light obtainable from kerosene, having from four to five times the lighting power of the ordinary lamp, and using almost twice the oil an ordinary lamp does. The light was sufficiently intense to cause a coal gas flame to throw a quite dense shadow (but from recollection much less intense than acetylene). This was probably the safest lamp ever put into use, but it was fairly expensive and rather heavy. It has not been on sale for many years, and the patents have probably long since expired. It possesses so many points of excellence that it might be a profitable matter to rediscover it in the Patent Office records and place it once more on the market.

Another is the famous "student lamp," which seems to have gone almost completely out of existence. The fire record of that device was not very good, in fact, considering the comparative number in use, probably worse than any other type

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of metal lamps. This was a tubular wick device, and it has probably passed forever out of general use.

INCANDESCENT LAMPS

There is another group of devices using kerosene (and gasoline) in which complete combustion of the oil is sought, the oil being converted into vapor, mixed automatically with air and so burned, light being obtained indirectly through incandescent mantles. These devices form a group separate and distinct from those listed here, and they must be considered separately. In all of this the indiscriminate manufacture and sale without restriction of appliances involving fire hazard seems to a great extent to be the basic trouble.

If by some plan factories could be brought under sufficient supervision to regulate the character of their output so far as public safety would seem to require, much good could be accomplished, and there is no apparently good reason or principle against establishing as much of a censorship over fire-producing appliances as over poisonous products.

The burner used for figures 1, 2 and 3 was taken from a so-called "exploded" lamp (actually "flare").

NOTE. Conditions of care and usage in stores and factories differ materially from those of residences and suggest the superiority of metal fonts where regular skilled attention can be afforded.

Airplane Safety Is Coming

AVIATION appeals to the ideals and imagination of the people. Unfortunately, however, it must be recognized that the average man regards aviation as exceedingly dangerous.

Every serious accident is published on the first page of all newspapers throughout the country. The average citizen reads the daily paper, and is impressed by the number of fatalities.

It is, therefore, of utmost importance that during the commercial development era we are entering all possible means be taken to eliminate accident and recognition given the fact that public support will be in inverse ratio to the number of serious accidents recorded.

Fatal accidents may be grouped in three general classes:

1. Failure of the pilot.
2. Failure of the plane.
3. Failure of the power plant.

Failure of the pilot is the most difficult to guard against. The bureau charged with granting civilian licenses is, however, insisting upon a high standard of personal efficiency. This must be rigidly maintained.

Failure of the plane is exceedingly rare. Recent statistics show that only 7 of 288 fatalities were caused in this manner. In this respect it must be recognized that this risk in standard types of planes is practically negligible, and that practically all of such failures occur in experimental planes. The public should be brought to an understanding and recognition of these facts and be taught to differentiate between standard proven types and experimental designs.

Failure of the power plant resulting in accident is more frequent. This necessarily results from the conflicting demands of reduced weight and increased power. Stresses on the high-powered airplane engine and high speed propellers are enormous. Breakage of propellers and crankshafts are consequently still comparatively frequent.

The solution of this problem is two-fold: (1) By improved design and material, to reduce the danger of such breakage; and (2) by the employment of the automatic ignition interrupter to limit the serious consequences of such breakages when they do occur.

Serious consequences from breakages of this nature are due to the unbalanced torque under the continued development of power. In many cases the pilot cannot act quickly enough to prevent serious damage and even fire, and hence, the necessity of adopting an automatic device to accomplish this end.

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Polishing Guard

By R. A. Shaw
Ford Motor Co.

IN the May, 1919, issue of SAFETY ENGINEERING, I noticed a photograph showing the installation of a dust removal system.

I would like to call attention to a standard polishing guard which is used extensively in the Ford Motor Company's plant.

The accompanying photographs show this guard, in one case, closed and ready for operation and in the other case open. It will be noticed how quickly and easily the guard can be opened for the insertion or removal of the wheel, the removal of dust, etc.

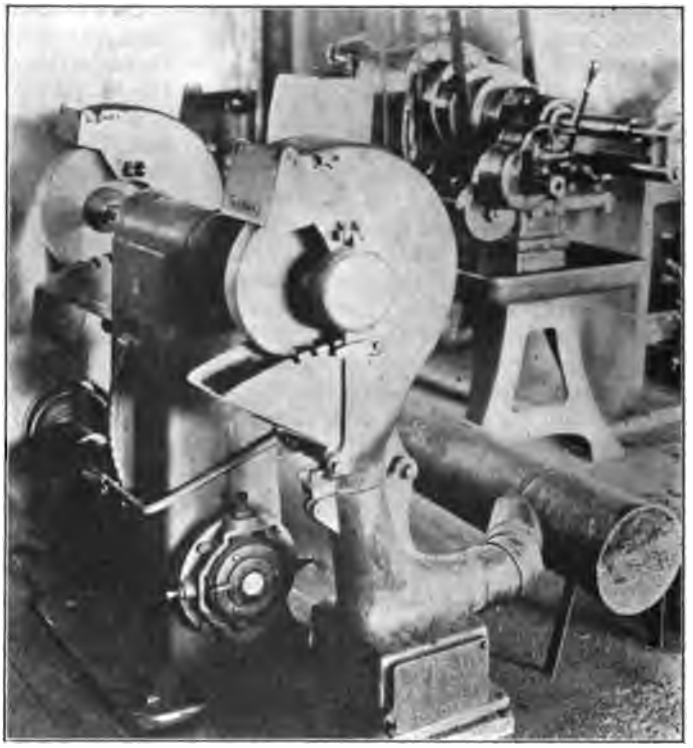
This guard may be constructed very economically and it has proved unusually satisfactory in operation, as it is fully adjustable.

Some of the readers of SAFETY ENGINEERING may be interested in seeing this guard as pictured and explained herewith.

The cut at the top shows the guard in a closed position; the cut at the bottom shows the guard in an open position.

The adjustability of the device is a merit that is appreciated by workmen.

As stated, its cost is moderate, a consideration not to be overlooked.



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Lacquers, Shellacs, Enamels and Japans

Tentative Safety Standards Prepared by the State of New Jersey

[Tentative safety standards covering the use of lacquers, shellacs, enamels and japans have been prepared for the Department of Labor, State of New Jersey, by John Roach, Chief of the Bureau of Hygiene and Sanitation.

On September 17, 1918, a fatal fire occurred in the plant of the American Button Company, Newark, N. J. Eleven lives were lost. It was brought out at the coroner's inquest that a considerable quantity of lacquer was being used in spraying metal buttons and that an electric spark from a ventilating fan, used to remove the vapors, had ignited the lacquer. The flames spread rapidly and, although the building was provided with a standard type outside iron fire escape protected by standard type fire doors and metal windows, eleven workers (nine women, one man and one boy) were trapped on the third floor of the building and were burned to death.

This disaster brought forcibly to the attention of the Department of Labor the great hazard to life, limb and property when inflammable liquids are used and suitable precautions are not taken. Shortly after the fire the Commissioner of Labor deputized Mr. Roach to make an investigation of the entire subject and to outline rules that would afford adequate protection to life, limb and property in industries where inflammable solutions, liquids or compounds are used that give out an inflammable vapor at ordinary temperatures.

The rules prepared by Mr. Roach require fire resistive construction; indicate the kind of apparatus that must be used for ventilating spray booths and stipulate how baking ovens must be constructed. The fire protection rules provide that where more than one gallon of material is used in a day's work the room in which lacquering is carried on must be sprinklered.

These tentative rules, SAFETY ENGINEERING is informed, have been submitted to all of the underwriters' associations in the East and Middle West. In addition copies have been mailed to the departments of labor of Ohio, Pennsylvania, New York, Connecticut and Massachusetts.

A meeting will be called some time in late July or early August at which these tentative rules will be considered by fire underwriters and representatives of State departments of labor as above mentioned.]

TENTATIVE Safety Standards proposed by the Department of Labor, New Jersey, covering the use of Lacquers, Shellacs, Enamels and Japans.

APPLICATION OF THESE RULES

The following rules apply to all establishments using lacquer, shellac, enamel and japan either by the spraying, hand brushing or dipping methods, except that where not more than two quarts of material, inclusive of stock and thinner, are used per day in the hand brush or air brush process. The rules governing construction for all interior lacquering, shellacing, enameling and japanning rooms (rule 3, walls, floors and ceilings) do not apply.

DEFINITION

Rule 1. For the purpose of these rules, lacquers, shellacs, enamels, and japans shall be considered to be any solution, liquid or compound which includes a solvent or thinner that gives off an inflammable vapor at ordinary temperature.

ROOMS USED FOR DIPPING, BRUSHING AND SPRAYING

Rule 2. Location:

Sec. a. In isolated plants where dipping, brushing and spraying of lacquers, shellacs, enamels and japans are carried on, these processes should, if possible, be located in separate detached buildings, especially if it does not interfere seriously with the general operations of the plant. In isolated properties where these processes are extensive, these operations shall be located outside the main building. Where this is impossible on account of space, adequate window protection shall be provided to retard the spread of fire from one floor to another by way of the windows.

Sec. b. The lacquering, shellacing, enameling and japanning by either the dipping, brushing or spraying process shall, when located inside of any building used for other purposes, be carried on in a room of fire resistive construction as hereinafter specified. It should be located preferably in a corner of the building. The door leading to this room should be located not closer than 20 feet to any means of egress including outside fire escapes.

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A View of the American Button Company's Factory, Newark, N. J., Where Eleven Employes Lost Their Lives on September 17, 1918

The door opening to any such room should be located so that it will not be closer than 20 feet to any means of egress or vertical opening unless such vertical opening be in a standard fire resistive enclosure. Lacquering, shellacing, enameling and japanning, whether the process be by dipping, brushing or spraying, should be located in a room along an outside wall with doors or windows communicating with the outside air.

CONSTRUCTION FOR ALL INTERIOR LACQUERING, SHELLACING, ENAMELING AND JAPANNING ROOMS

Rule 3. In order to provide the maximum degree of protection, these processes should be carried on in a detached building or in a room having walls, ceiling and floor of 12-inch fire resistive construction. If permitted inside of a building used for other purposes, the following class of construction, which is estimated to hold a fire for at least one hour, will be accepted:

Walls:

Sec. a. To be of brick not less than 8 inches thick.

Sec. b. Hollow tile not less than 6 inches thick covered on both sides with one inch of cement plaster.

Sec. c. Solid gypsum block 4 inches thick.

Sec. d. Studded walls 4 inches thick with expanded metal on each side and covered with one inch of cement plaster. Where wood studs are used, the staples for securing the expanded metal must be not less than 1½ inches long.

Sec. e. Wood studding of 2x4s with two thicknesses of 1-inch D. & M. boards on inside covered with ¼-inch asbestos board and lock jointed tin (without any perforations for pipes or fixtures).

Sec. f. Wood studding of 2x4 with two thicknesses on the inside of ⅜-inch plaster board secured with 2-inch nails

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and protected with No. 24-gauge sheet metal for a distance of 42 inches above the floor.

Sec. g. Any other form of light partition that will resist a standard fire test for one hour.

(Note: None of the partitions shall have any perforations for pipes or fixtures.)

Floors:

Sec. a. Shall be preferably of incombustible non-abrasive material. It is recommended that a ⅝-inch thickness of approved prepared floor covering be spread over the existing flooring.

Sec. b. Double wood flooring with the top flooring of one-inch hard wood.

Ceilings:

Sec. a. Ceilings, in non-fireproof buildings, shall be covered with expanded metal and a ¾-inch thickness of cement plaster or its equivalent. The expanded metal should be secured in place with staples not less than 1½ inches long.

Sec. b. Two thicknesses of ⅜-inch plaster board or one thickness of ½-inch plaster board secured with 2-inch nails and covered with metal ceiling.

Window Openings:

Sec. a. Where it is considered necessary by the Department of Labor, window openings in exterior walls of lacquering, shellacing, enameling, japanning and drying rooms shall be protected with standard self-closing wired glass windows in standard metal frames.

Egress:

Sec. a. At least two means of egress located at oposite ends of the room or as near thereto as possible shall be provided; these to have self-closing swinging doors (swinging out) not less than 2 inches thick, constructed and hung in accordance with the rules and requirements of this Department for such doors. Where feasible, one means of egrees should be to the outside of the building either directly to grade or to an adjacent fire escape.

Benches:

All benches must be covered with soft sheet metal (zinc, copper or brass).

VENTILATION

Rule 4.

Spraying Rooms:

Where goods are sprayed with an air brush, the vapor shall be removed by an approved mechanical exhaust system.

Sec. a. Substantially constructed metal hoods shall be erected over the spraying benches. These hoods and vent pipes shall be constructed of not less than No. 16 U. S. gauge metal with lapped seams and riveted joints provided with suitable tight fitting clean-cut doors at sufficient intervals to facilitate cleaning and be ventilated by a mechanical exhaust system discharging to the outer air. Where the exhaust fan is of the direct motor driven type and permits vapor to come in contact with the motor, motors must be of the enclosed induction type and protected with removable metal shield of No. 16 gauge galvanized iron.

Sec. b. The outlets of the vent pipes shall be provided with suitable hood or shield and so located as not to constitute a hazard to adjoining or adjacent structures.

Sec. c. All wiring to the motor must be in rigid conduit and the controling switches and fuses must be outside of the workroom.

Sec. d. All exhaust fans of the direct motor driven type shall be approved by the Department of Labor before installation.

Sec. e. Where Standard Steel Plate exhaust fans (or exhaust fans of a similar type) are used, they shall be installed on proper foundations and secured in place in a manner subject to the approval of the Department of Labor.

Sec. f. Bearings of the exhaust fans shall not extend inside of the exhauster casings or vent pipes.

Sec. g. It is recommended that oilless self-lubricating bearings be used made of bronze bushings with plugs such as graphite or metaline.

Sec. h. Connections between discharge end of blower and main vent pipes must be made so as to prevent leakage.

(Note: Attention is directed to the fact that while enclosed motors of the induction type may be used, the danger

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from the motor starting a fire is not entirely removed.)

Alternative Method of Ventilating Spraying Hoods:

Sec. a. Where hoods are ventilated by a mechanical exhaust system discharging to the outer air the bearings of blowers if operated by a 1-quarter horse power motor, shall be located outside of the blower casings or vent pipes.

Sec. b. Where exhaust fans are motor driven, the motor must be located outside of the spraying hoods and ventilating ducts.

Sec. c. If motors are located in the spraying room they must be of the totally enclosed type.

Sec. d. Sections "c", "d", "e", "f", "g", and "h" of Rule 4—Ventilation—given above apply also.

Dipping and Hand Brushing Rooms:

Sec. a. All rooms or enclosures in which the dipping or hand brushing process is carried on shall be well ventilated at the top and bottom by suitable screened openings to the outside air.

DRY ROOMS

Rule 5.

Sec. a. When not in a separate building constructed to confine the hazard therein, nor otherwise cut off from the main building, dry rooms shall have the walls, ceiling and floor constructed of incombustible material; if sheet metal is used on metal frame, the sheet metal must be not less than No. 16 U. S. gauge and be riveted to angle iron or equivalent frames; doors to be the equivalent of the wall construction, and in accordance with the rules and requirements of the Department of Labor. The floors of the dry rooms should be of incombustible material at least four inches thick. Regardless of the degree of temperature required, whether high or low, wood or wood lined rooms are not recommended.

Sec. b. Dry rooms should be heated by steam, hot water, or hot air with pipes located preferably overhead or at sides.

Sec. c. Dry rooms shall have ventilation to the outside of the building.

Sec. d. Vent pipes from dry rooms shall be constructed of not less than No. 22 U. S. gauge metal with lapped seams and riveted joints run as directly as possible to the outside air and provided with suitable hood or shield at the outlets. The pipes should be at least 6 inches from combustible material. The pipes should be at least 6 inches in diameter for drying rooms of 100 cubic feet capacity or less; 8 inches in diameter for over 100 and not more than 200 cubic feet; dry rooms larger than 200 cubic feet to have 20 square inches of vent pipe area for each 100 cubic feet of capacity. When pipes pass through a non-fire-resistive roof they shall be guarded by ventilated metal casings having a clearance of at least 6 inches from combustible material; casings to extend from ceiling to at least 9 inches above roof. No vent pipe shall pass through any floor or through any interior fire wall nor connection with any other ventilating blower system. Such pipes shall be run separate to the outside air. Pipes shall be cleaned at regular intervals to avoid excessive deposits of combustible material.

Sec. e. Dry rooms should be provided with automatic sprinklers having a constant source of water or steam supply.

Sec. f. Care shall be taken to keep dry rooms clean and free from accumulations of dust and foreign matter.

LACQUER, SHELLAC, ENAMEL AND JAPAN OVENS

Rule 6.

Sec. a. All lacquer, shellac, enamel and japan ovens shall be of some approved incombustible material; walls, if made of sheet metal, to be double and separated at least 1½ inches by a space filled with vitrified cellular asbestos boards or other equally sufficient insulation which will not settle.

Sec. b. All ovens shall have a vent pipe in the baking compartment, pipe shall be constructed and installed in accordance with Rule 5, Section "d". No damper in any vent pipe shall be larger than 2/3 of the cross sectional area of the pipe. The oven doors shall be so arranged that they cannot be opened unless the damper in the vent pipe is open. One or more hinged relief covers shall be provided at the top of the baking compartment of the oven; area of the cover to be approximately 4 square feet for each 100 cubic feet of oven space.

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Another View of the American Button Company's Plant After Fatal Fire of September 17, 1918

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Sec. c. Heat should preferably be by steam or electricity. When gas heat is used, the fire chamber and the smoke flue shall be cut off by tight partitions from the baking compartment or otherwise arranged to avoid the possibility of the gas flame igniting inflammable vapors inside the oven. Provision must be made to keep the flame from coming near enough the partitions around the baking compartment to heat them sufficiently to ignite fumes therein. Baffle plates or cylinders used for this purpose shall be at least ⅜-inch in thickness. The burner end of the oven should open into a separate room cut off from the oven room by vapor tight partitions and be entered only from the outside of the room.

Sec. d. Ovens shall be mounted on fireproof floors but in no event shall there be less than 4 inches of hollow tile or its equivalent between the bottom of the oven and any other floor or stand.

Sec. e. Ovens should not be located in a building with other occupancy. If so located, they shall be in a room of vapor tight incombustible walls, floor and ceiling, outside ventilation at the floor level to the outside air to be provided for such room.

DIP TANKS

Rule 7.

The process of dipping articles in tanks containing inflammable mixtures should be carried on in a detached building used for no other purpose, located at a safe distance from other property. It is impossible to entirely eliminate the dip-tank hazard where inflammable liquids are used, even though all practicable safeguards are provided.

If the dipping process is permitted inside the main building or in an adjoining building, the room in which the hazard exists should preferably be on the lowest floor, but not below the grade line, nor on a floor immediately above a cellar or basement, and should be used only for dipping processes. Side walls and ceiling of the dipping room to be of fireproof construction at least equivalent to 8 inches of brick. There should be a standard fire wall cutting off the room from the rest of the plant; the floor should be fireproof and waterproof; it should pitch to a point at which is located a drain pipe leading outside the building and terminating at a point where liquids flowing therefrom will not endanger surrounding property.

The drain pipe to be at least 6 inches in diameter and to have a coarse strainer (about ¾-inch mesh) at floor. No drain pipe connection shall be made to a sewer. The floor should be 6 inches lower than the floors of adjoining rooms, or the thresholds should be raised that distance and partitions should be flashed so as to guard against inflammable liquids flowing to adjoining rooms. Metal covering for floor is not advised. The room should be well ventilated at top and bottom by suitable screened openings.

(Note: In large dip-tank installations a more positive system of ventilation will be necessary.)

When practicable a metal hood should be located directly over each tank; hood to terminate in a metal pipe discharging into a properly constructed chimney used for no other purpose. The hood to extend well over the sides and ends of the tank and to be sufficiently low to prevent water from being thrown into the tank from automatic sprinklers. The hood and pipe should be designed to take off flames from the burning liquid in case the automatic cover should fail to operate.

Requirements for Tanks:

Sec. a. Construction. To be constructed in a substantial manner of steel or of cast iron. The edges of tank, tracks (when used in connection with covers), and all working parts, to be so constructed and shielded as to protect same against mechanical injury and accumulation of drippings sufficient to interfere with the operation of the cover.

Sec. b. Covers. Covers may be either hinged or sliding on tracks and should be normally held open by approved types of metal chains containing fusible links, one such link to be near top of tank and one at the ceiling above the tank. Such covers may be constructed either of metal, not less than No. 12 U. S. Gauge, reinforced by an angle iron frame, or of two-ply ⅞-inch tongued and grooved board not over 6 inches in width and

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covered on all surfaces with lock-jointed tin and in all cases such covers shall overlap the side and ends of tank at least two inches.

All covers to be so designed and installed that operation will be automatic and secure positive closing without danger of sticking when released by action of heat on the fusible links or by manual operation. Covers to be closed when tanks are not in use. Hinged covers to be secured with strong metal hinges offset and protected against gumming.

Covers operating by gravity on tracks to be provided with deep and wide grooved wheels, properly shielded so as to prevent accumulation of drippings on them or their tracks, and to be provided with a guard to prevent the wheels leaving the tracks. The inclination of the tracks on this style of gravity cover to be not less than ¾-inch to the foot.

Sec. c. Drip Boards. Each tank to be provided with drip boards to protect working parts of cover and return all drippings to the tank. Boards to be of incombustible material and readily permit of cleaning.

Sec. d. Agitator. Each tank containing liquids holding materials in suspension should be provided with an agitator or other facilities designed to effectively prevent sediment accumulating and hardening on the bottom of the tank.

Sec. e. Overflow. Tank to have an iron or steel overflow pipe leading outside of building to a cistern. Pipe to be without traps or unnecessary bends and to lead as directly as possible to the cistern. This pipe to be at least 3 inches in diameter when the tank holds less than 100 gallons and increased proportionately for larger tanks. Overflow to have a coarse strainer at tank (about ¾-inch mesh).

Sec. f. Drains. Each tank should preferably be provided with a drain pipe of sufficient size to empty tank in about sixty seconds. The drain to be provided with a valve capable of being operated both manually and automatically. The valve opening should be at least 60 per cent larger than the cross sectional area of the drain pipe. The operation of the valve should be sufficiently positive to overcome any danger of sticking or clogging due to the accumulation of sediment.

The drain valve to be so designed that when open, it will not interfere with the agitator, and so that the agitator will effectually assist in keeping the passage to the drain valve clear of sediment. Drain pipe to connect directly or through overflow pipe to a cistern.

(Note: In case of large tanks underwriters having jurisdiction may require the use of drains as recommended above.)

Sec. g. Cistern. To be of sufficient size to hold the aggregate capacity of all tanks emptying into it. To be detached at least 30 feet and located in ground sloping down from buildings, or to be so arranged that any overflow cannot endanger property; otherwise the cistern must have at least twice the capacity of all the dip tanks draining into it, and be substantially constructed of masonry, or metal, so as to be water-tight. Such cisterns to be buried underground, covered and otherwise arranged to prevent filling of same with water. A proper vent must also be provided. Overflow and drain pipes to dip under water and terminate near bottom of cistern.

Sec. h. Care and Attendance. Heating to be done only by steam or hot water. No steam boiler, furnace or exposed fire, nor any electric dynamo or motor or other spark emitting device, to be allowed in any room used for dipping processes or dangerously exposed thereto, or in line with vapor travel therefrom.

Sec. i. No open light or flame shall be allowed in any such room, and for electric lighting, lamps shall have keyless sockets and be protected by vapor-tight outer globes. Switches shall be placed outside of room and beyond the presence of ignitible vapors, and the whole shall be done according to the National Electrical Code.

Sec. j. All such rooms to be provided with a high pressure steam line fed from a boiler of sufficient capacity to admit of flooding the rooms with steam in case of fire. Operating valves to be located outside building. Any other method of protection judged to be equivalent may be submitted and will be accepted if found satisfactory.

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HAND BRUSHING

Rule 8.

Where the hand brushing process is sufficiently extensive to make these rules applicable, the requirements for construction, benches, lighting, heating, fire protection and handling and storing of stocks covering the spraying process shall apply

STORAGE AND HANDLING OF LACQUERS, SHELLACS, ENAMELS, JAPANS, THINNERS AND OTHER LIQUIDS, EMITTING INFLAMMABLE VAPORS AT ORDINARY TEMPERATURES

Rule 9.

Sec. a. All lacquering, shellacing, enameling, japanning, thinning and other liquids, emitting inflammable vapors at ordinary temperatures, should be stored on the outside of the building in steel tanks buried at least 2 feet under the ground, or otherwise isolated in full compliance with the requirements of the Department of Labor.

Sec. b. A quantity not to exceed 5 gallons of stock and thinner may be stored inside of the main building when kept in an approved metal box as provided for under paragraph "d" below.

Sec. c. Permission may be granted to store above ground, a limited quantity of these materials, provided the total amount of gasoline, benzine, naphtha or other volatile inflammable liquids does not exceed 10 gallons in approved safety can or cans, lacquers, shellacs, enamels, japans, paints, turpentines or similar materials not exceeding 25 gallons in all may be stored in ordinary metal cans. All such stocks when not in use to be stored preferably outside of building on a permanent metal shelf securely fastened to wall and not directly in front of or under a window; the shelf to be provided with a metal guard rail so that the can or cans cannot readily be dislodged by accident. The use of fire escapes for the storage of inflammable liquids or other materials is prohibitel by law.

(Note: A box of sheet iron or other incombustible material is recommended as a protection against the weather and a convenient method of putting the supply under lock and key; the box will also fulfill the above requirements for a guard. Small openings should be provided near top and bottom of box for ventilation.)

Sec. d. Permission may be granted to store within a building any of the above mentioned materials in the amounts and receptacles specified, if kept within an approved cabinet located in the room with the process or one with equivalent construction. An approved cabinet should be tightly enclosed, made of suitably stiffened sheet iron at least No. 18 U. S. gauge in thickness, double-walled with 1½ inch of air space or equivalent construction. Doors should be equivalent to the walls of the cabinet, provided with 3-point lock, fit closely and be kept closed when not in use; door sill raised at least 2 inches above bottom of cabinet. Cabinet shall be vented 3 inches above bottom and close to top of a vent pipe having an area of at least 10 square inches and made of not less than No. 22 U. S. gauge metal, with lapped seams and riveted joints, run at least 6 inches from combustible material as directly as possible to the outside air and provided with a suitable hood or shield at outlet.

Sec. e. Where conditions require the use of these materials in a separate vapor-tight room, the cabinet, if inside of building, shall be located in such room.

Sec. f. When there are open fires or flame on the same floor on which any of these materials are used and a separate vapor-tight room is not provided, the total amount of the above mentioned materials shall not exceed five gallons and cabinet as well as the process shall be located not less than 25 feet from open fires or lights.

FIRE PROTECTION

Rule 10.

Sec. a. Where more than one gallon of material is used in the course of a day's work, automatic sprinklers should be installed in lacquering, shellacing, enameling, japanning, drying and baking rooms on the basis of one sprinkler head for each 60 square feet floor area; the sprinklers to be supplied from a 2,000 gallon gravity tank with the bottom at east 25 feet above the highest line of sprinklers, or, the sprinklers may be supplied from a city water main not less than 6 inches in

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diameter with the pressure on the highest line of sprinklers for not less than twenty pounds.

Sec. b. In all rooms, regardless of the quantity of stock used, at least 4 pails of clean dry sand with scoops and 2 1-quart extinguishers using carbon tetra chloride shall be installed. Additional sand pails and extinguishers shall be installed if, in the opinion of the Department of Labor, it is necessary.

LIGHTING

Rule 11.

Sec. a. Only electric incandescent lighting shall be permitted in rooms where any of these processes are carried on.

Sec. b. All wiring shall be installed in rigid conduit and in accordance with the National Electrical Code.

Sec. c. All fuses, switches, and electrical devices must be located outside of such rooms and all lights shall be provided with vapor proof globes and wire guards.

HEATING

Rule 12.

Sec. a. Shall be low pressure steam or hot water with all piping at least one inch from woodwork and so arranged or protected so as not to permit drippings to come in contact with the piping.

Sec. b. If electric heaters are used to warm the stock used in air brush apparatus they shall be of a type approved by the Department of Labor.

GENERAL REQUIREMENTS

Rule 13.

Personnel.

Sec. a. Only adult persons shall be employed to do spraying, brushing or dipping of lacquered, shellaced, enameled or japanned goods as defined by these regulations.

Sec. b. That authorized persons thoroughly familiar with the process and danger shall instruct the workers on the safe operation and maintenance of the equipment and cleanliness.

Sec. c. Workers who are employed in these rooms or whose duties require them to enter the rooms are forbidden to carry matches.

Sec. d. It shall be the duty of the employer to cause a search into the clothes of these workers employed in these operations at irregular intervals weekly.

Sec. e. Approved metal lockers shall be provided for the clothing of employes employed in the lacquering, shellacing, enamelling and japanning rooms and employes' clothing must be kept therein.

CLEANING

Rule 14.

All lacquering benches shall be cleaned daily and all ventilating ducts, fan, shield for motor hoods, and drying racks weekly. If a metal tool is used for this purpose it must be of non-sparking material.

Sec. a. It is recommended that in order to facilitate the removal of lacquer from metal parts that these be coated with paraffine.

Sec. b. A false bottom made of cardboard or other light material that may be removed daily should be placed in each ventilating hood.

SMOKING

Rule 15.

Smoking on the premises is positively forbidden.

EXPOSED FLAME OR SPARKS

Rule 16.

No open fires or lights and no electric or other appliances which are likely to produce an open spark shall be permitted on the same floor or in the same room where any of these processes are carried on, unless the room or rooms in which the inflammable vapors may exist are cut off from the remainder of the floor in which the open flame exists.

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EDITORIAL

STARTLING EXAMPLES OF THE CARELESSNESS OF PHYSICIANS IN REPORTING CAUSES OF DEATH

ONE of the interesting and original things in Dr. Dublin's notable volume on "Mortality Statistics of Insured Wage-Earners and Their Families", a compilation of the experience of the Metropolitan Life Insurance Company, is the system of inquiry conducted by Dr. Dublin to clarify medical data regarding causes of death. It has been ascertained that an important source of error in statistics of causes of death arises from the habit of certifying physicians to report only conditions that were merely the terminal incidents in the course of the last illness. As a result of special inquiries by Dr. Dublin, some remarkable revisions were secured of the original reports of causes of death. For example, during the period 1911-1916, the Metropolitan received 2,280 reports of death from "Fractures, cause not specified"; after inquiry the number was reduced to 806, a decline of 64.6 per cent. Original reports for the same period showed 5,052 deaths from "Paralysis without specified cause"; after inquiry the number was reduced to 2,773, a reduction of 45.1 per cent.

Naturally, the revisions do not always show reductions in the number and percentages of deaths originally attributed to particular causes. Of 45 causes of death only 14 were revised downward, the revisions were upward in the other 31 cases. "Traumatism by Fall" was credited in the original reports with 5,558 deaths and in the revised reports with 6,917 deaths, an increase of 24.4 per cent. "Gonococcus Infection" was charged with 83 deaths in the first reports and with 200 deaths in the revised reports, an increase of 141 per cent.

SAFETY ENGINEERING has called attention to the need for more accurate statistics regarding the real causes of accidents in the industries, on the streets and elsewhere. Accident statisticians frequently confuse the location of an accident with its cause. A man overcome with vertigo may fall in front of a trolley car and be crushed to death. Such a casualty may be recorded as a trolley car accident, whereas the trolley car was not originally to blame. The physical condition that caused the vertigo was the real cause. A workman may slip on a dangerous stairway and plunge into a vat of boiling liquid. The accident statistician might classify the accident under the head, "Scalded to Death," although the real cause was the bad condition of the stairway. Similar illustrations could be multiplied.

Obviously the location of an accident is an important fact. Safeguards must be installed wherever accidents are liable to happen—the trolley car must be equipped with fenders and the vat of boiling liquid should be placed, or protected, so that no person could fall into it.

The safety engineer, who must be an engineer in fact as well as in name, has interesting and sometimes intricate problems to study and solve. He must be able to detect antecedent causes as well as proximate causes of accidents. His job is man-size. Always he must count on a certain degree of so-called "carelessness" among workers, and it is his business to find the proper engineering method to reduce the effect of that "carelessness" to the lowest possible expression, especially in fatalities and major injuries.

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The Library's Part in the Reduction of Industrial Accidents

By Estelle L. Liebmann

Librarian, National Workmen's Compensation Service Bureau

Proceedings of the Special Libraries Association, June, 1919.

[Abstract of a paper on "Industrial Accidents and the Library's Part in Their Reduction." Miss Liebmann estimates that there are now about 2,500 special safety engineers in the United States and possibly 40,000 to 50,000 other persons whose duties are partly connected with safety work. Her remarks concerning the limited number of real safety books and her small list of libraries that are fairly complete repositories of accident prevention and fire prevention literature will be accepted as real information.]

THE safe construction of a machine or a plant must begin with the first draft of the design. The problem is to think safety and in terms of safety. The guarding of machinery has very often been merely an afterthought to rectify faults of construction. What the future machine designer and builder will do and is doing now, to some extent, is to build safely from the start.

With every speeding up process the danger to the workman becomes greater. There is less care, more speed. We know already that the accidents for the war period will be greater than perhaps at any other period in the history of this country. The reports for 1917 and 1918, as they are being received, show a tremendous number of accidents. The toll of lives in the industrial plants will probably be almost as high as on the battle fields, while the number of those permanently disabled by industrial accidents in the last year will be almost as great as those permanently disabled by war, if we figure only on those wounded in battle, omitting those who are killed or disabled by sickness. We shall never be able to compare them exactly, as the statistics of war casualties are much more accurate and complete than those for industrial casualties. According to one recent authoritative statement the accidents occurring in this country are equal to two European wars.

The total annual number of industrial accidents has been estimated by both Dr. Rubinow and Dr. Hoffman as about 2,000,000, including 22,500 fatal accidents. According to the Standard Accident Table, compiled by Dr. Rubinow, 4.8 per cent of non-fatal cases retain some permanent disability, which, added up for 2,000,000 cases, results in 96,000 permanently injured men every year. The total number of fatal cases in our army, omitting those dead of disease, is over 60,000; but the number wounded does not show how many permanent disabilities there will be. Up to April, 1919, the War Risk Bureau has had nearly 50,000 applications from permanently disabled men.

Persons who have followed the safety movement since its inception in this country, some ten or twelve years ago, have been fully aware of this tremendous scourge in our industrial world. We have enacted compensation laws in all but seven States, nearly every State has some kind of a department of labor or factory inspection, and large corporations and plants have organized their own safety work. But laws and rules can be written on the books and be of no avail unless the life and spirit is there to make them vital and living.

The economic side is even more important than the social. We know how much money is spent for compensation but no one will ever know the exact cost of accidents. We cannot figure the exact cost to the community, the employer and the victim of an accident. We have never valued labor as it is being valued now.

Libraries of every description, whether public or private, can be of the greatest value to this problem. Many libraries have large and extensive collections on

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labor questions but I doubt whether more than a very small number have ever given any special consideration to safety literature. Plant libraries are much better equipped than public libraries, as many large concerns have employment managers and safety engineers to whom these questions are of vital importance and who must have the latest and best information. It is largely due to some of the large plants that safety has become a vital matter. The census of 1910 lists the number of manufacturers employing 500 and more at about 2,000, but the present estimate is about 2,500. There are very few plants employing less than 500 that would undertake to establish a separate safety department with a safety engineer. The greater number of plants have some one who divides his duties as safety engineer with other duties, or a committee organization is formed, or perhaps the safety work is simply a matter of physical inspections. There are about 2,500 special safety engineers in this country and between 40,000 and 50,000 people whose duties are partly connected with safety work. To keep up the interest and effectiveness of safety work requires constant pressure, enthusiasm and a good morale. The National Safety Council has a membership of about 4,000, representing about 7,000,000 workers. It is now reaching out and organizing safety in public and technical schools and colleges and in promoting public safety. The Safety Institute of America also reaches many by lectures and slides and gives advice on safe practices and devices. But there are still many people in all conditions of life who are not touched and it is only by constructive and educational effort that these can be reached.

Every library, no matter what kind, how small or how large, that has anything to do with the laboring element should have at least the first aids in accident prevention and safety. Workmen, foremen, builders of machinery, sellers of machinery, manufacturers in all lines, are interested in the safety and care of their men and of themselves. A workman invents a new safeguard—does it comply with the law? A foreman cannot understand why one of his men constantly disregards the rules and others don't care until he finds out that he can create an interest by forming committees and starting a safety organization. The builder of a machine wants to lay the foundations of a well planned, safely operating machine, the seller of machinery wants a good selling project, and so you see safety is a far reaching problem.

There are four libraries in the United States that have made safety engineering and accident prevention their specialty. These are the libraries of the National Safety Council in Chicago, the Safety Institute of America in New York, the Independence Bureau in Philadelphia and the National Workmen's Compensation Service Bureau in New York. The first two are public or semi-public in character, depending upon their membership for support. They have focused their attention largely upon commercial undertakings but are now extending their work to municipal and educational activities. The other two are special libraries connected with private concerns. The Independence Bureau is a firm of consulting engineers for fire and accident prevention and industrial relations. The National Workmen's Compensation Service Bureau is a service bureau under the auspices of the casualty insurance companies. None of these have been in existence very long, but all are organized and equipped.

The 10 State rating bureaus for workmen's compensation rates are information bureaus for their respective States. Among these, Pennsylvania has a library. The Federal Labor Department, the Bureau of Standards and the Federal Board are also building up collections that include safety engineering and accident prevention. But the four libraries specified are all willing to act as aids either in helping other libraries select books or in answering questions. The most important thing for both industrial and public libraries is to know the literature of safety, some of which is undoubtedly familiar, a great deal of which has been catalogued but very little of which has been distributed to the people who ought to have it and who want it.

There are not half a dozen books that

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treat adequately of safety. The greater part of the literature is to be found in pamphlets, documents and periodicals. The most valuable government documents are those of the Bureau of Labor Statistics in Washington. Some States publish excellent standards, some very poor ones, some none at all. For the engineer and technical man the safety specifications published by the United States Steel Corporation, the Shipping Board and the DuPont Company rank highest. The Bureau of Standards will eventually issue safety standards. These are at present in a tentative stage and it may be a few years before the final draft is adopted. Not many libraries realize that the fire and casualty insurance companies have large and expensive engineering departments whose business it is not only to give the members of the company staff advice but also to give their clients advice. The Travelers Insurance Company and the Aetna Insurance Company are some that have published some excellent treatises written by authorities and containing reliable data.

The annual proceedings of the National Safety Council contain articles by the best authorities. Seven volumes have been published and their contents cover practically every industrial hazard.

What is to be regretted is that there are no popular books on safety. Do you remember the tragic note in Dr. D. H. Lawrence's "The Widowing of Mrs. Holroyd" or the little play the Neighborhood Playhouse in New York gave a few years ago called "The Price of Coal"? Do you remember the death of Stephen Blackpool in "Hard Times" and his dying words as he is brought out of the coal pit: "I ha' fell into the th' pit, my dear, as have cost wi'in the knowledge o' old fok now livin, hundreds and hundreds o' men's lives—fathers, sons, brothers, dear to thousands and thousands, an keeping 'em fro' want an hunger. I ha' fell into a pit that ha' been wi' th' firedamp crueller than battle. I ha' read on't in the public petition, as onny one may read, fro' the men that works in pits, in which they ha' pray'n and pray'n the lawmakers for Christ's sake not to let their work be murder to 'em, but to spare 'em for the wives and children that they loves as well as gentlefolk loves theirs. When it were in work, it killed wi' out need; when 'tis let alone, it kills wi' out need. See how we die and no need, one way an another —in a muddle—every day!" That is what I mean by a popular book. The epic of labor has not yet been written. Some day some one will appear who will give us the life of the workman from the point of view of some one who has really lived it—a Jean Christophe of the working classes.

This is my message of safety. Let every library containing technical engineering information, whether public or private, develop its safety side. Let every library containing social and labor problems, whether public or private, develop its safety side. Bring to the libraries who are specializing on this subject your problems. They will be glad to assist you, advise you, and in turn take advice. They need you as much as you need them.

Getting Back Their Old Jobs

THE assistant to the Secretary of War, Colonel Arthur Woods, says that the work of getting positions for discharged soldiers and sailors has made a good start. All over the United States the War Department is securing the hearty co-operation of all the welfare services, chambers of commerce, labor unions, employers' associations, and many National, State and civic bodies, all of whom are at liberty to use the machinery of the United States Employment Service toward hooking up the discharged men of the Army and Navy with a good job. The patriotic assistance of employers, corporations, firms and individuals in the matter of reinstating their old men in the jobs they held before they went to war seems to assure between 70 and 80 per cent of the honorably discharged soldiers and sailors a return to their pre-war jobs.

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The Fire Protection Equipment of a Pacific Coast Terminal

East Waterway Dock & Warehouse Company, Harbor Island

THE Seattle *Daily Times*, in a recent issue, gave the following description of the fire protection equipment of the East Waterway Dock & Warehouse Company on Harbor Island:

Equipped with 10 4-gallon extinguishers, 75 3-gallon extinguishers, 15 other extinguishers, 3,000 feet of 2½-inch hose, 17 city hydrants and with concrete walls built at every strategic division in the 15-acre storage yards, the East Waterway Dock & Warehouse Company's huge terminal on Harbor Island is completing installation of additional safeguards against fire that will make it one of the show places of the ports of America. The improvements include a $75,000 sprinkler system.

The terminal handles both general cargo and Oriental oils. Its storage capacity in tanks and case oils is double that of any other Oriental oil terminal in the world.

Its fire-fighting force numbers 40 men, headed by Fire Marshal C. A. Moran, who is a member of the National Fire Protection Association. Because of the problem of insurance, the fire protection system in an Oriental oil terminal is one of its biggest features.

The Harbor Island terminal is pioneering the way for the rest of the country in this matter and nearly every week it is inspected by experts from other Pacific Coast ports, the Atlantic Coast, the Gulf Coast, Great Britain and the Orient.

Construction of another 4-foot concrete wall separating the site of the terminal's warehouses from the open storage provided for Oriental oils in cases and barrels is now nearing completion. Other additions are being made to the fire protection system that will make it as near perfect as human ingenuity can devise.

Fire Marshal Moran served eight years in the Seattle fire department and was assistant secretary to John Boyle when the latter was chief. In the terminal's fire-fighting force he has a large number of former members of the Seattle fire department.

In every respect the terminal's fire department is better than that of the average city of 35,000 inhabitants.

Sand dikes, 150 feet wide, divide the open storage acreage into two distinct yards. There are 125 sand barrels and shovels scattered through the terminal.

Buckets of bicarbonate of soda stand ready for instant use at the oil dumping tables. It is impossible to walk 100 feet anywhere in the whole terminal without running into fire-fighting equipment and devices, huge red signs showing the location of each. Every bulletin of the National Fire Protection Association is posted in the big plant, so that its men will keep abreast of the times.

At the sand dikes there are huge sumps or holes into which the oil would run in the event fire broke out in open storage yards, releasing the oils from the cases and barrels.

Recently work was completed on a 50,000-gallon watertank near the entrance to the terminal.

In the line of fire prevention the company has installed a system of electric jitneys which work all day long removing debris and odds and ends that might help spread fire. The equipment includes two hose carts. Every chemical is manned by a company. Fire axes meet the eye at every turn.

At night, the huge terminal resembles a fortress. Watchmen stationed on a tower sweep the plant with powerful searchlights. Flood lights show up every detail of every department. A stranger has as much chance of entering the terminal day or night as he would have of entering a fort in war time.

COMMENTS BY SAFETY ENGINEERING

The foregoing is of interest as showing the characteristic western energy in profiting by disaster, the lesson of the recent oil terminal fire in Seattle having apparently been read aright.

SAFETY ENGINEERING has neither plans nor data upon which to criticise any details. Seemingly, subdivision by fire walls has been thorough and ample, hose service provided as well as a method of inspection and systematic upkeep and, most important of all, automatic sprinklers, which for several technical reasons are generally considered the most effective means of controlling the primary spread of fire in properties of this class.

The equipment may be classed as a "fireman's equipment" because of the prominence given to manual apparatus but there seems no room to question the statement that it is the most complete and elaborate on the Pacific Coast and ranks very high among the highly specialized terminal equipments, for which no doubt much credit is due to Mr. Moran. There is certainly nothing apparent to be said that is not wholly commendatory.

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It would be of much general interest to know by what means the inherent tendency of that somewhat hygroscopic material, soda bicarbonate, has been overcome in the damp climate of the west coast and caking and liquefaction prevented. Presumably some effective means has been found and the secret should be published widely. The use of dry soda bicarbonate is usually restricted to a mixture of that material with sawdust in the proportion of 10 pounds of the former to a bushel of the latter.

The efficiency of equipments of this class depends much on the thorough instruction of the force and the judgment of the chief, since the misapplication of apparatus becomes very easy under excitement. Some very serious results, for instance, have followed the application of high velocity streams to tanks of burning oil.

Health of Metal Workers

THE National Industrial Conference Board made public on June 30 its fifth report, in the course of an extensive investigation of the effect of reductions in hours of work on output and on health of workers in various major industries.

The latest report covers Metal Manufacturing Industries.

The report states that conclusions as to the effects of reductions in hours of work on health of workers in the metal trades industries cannot be reached at this time, for the reason that data covering a sufficient period to permit satisfactory study are not in existence.

Of the establishments replying to the Conference Board's inquiries on this point, 8 reported an improvement in health conditions following reductions in hours to 50 or 48 a week, while 84 reported no noticeable change.

A particular difficulty in drawing conclusions arises from the absence of any recognized standard for measuring health conditions.

Statements of manufacturers furnished in the course of the investigation indicated generally favorable health conditions among their employes.

Certain occupational diseases, such as lead and brass poisoning, are prevalent in the metal trades; lead poisoning, however, is not characteristic of the particular branches of the metal manufacturing industry included in the investigation. In some processes acid and other fumes introduce an occupational hazard.

HIGH DEATH RATE FROM TUBERCULOSIS

"The evidence is clear," says the report, "that for a part of the industry the death rate from tuberculosis is exceedingly and unnecessarily high. It should, however, be pointed out that in general the branches characterized by exceptionally high death rates from tuberculosis employ a relatively small proportion of the workers in the industry. It is obviously incumbent upon industrial managers to make intensive study of the conditions peculiar to these branches of the industry, with a view to devising some means for bringing about a reduction in this excessive rate. Furthermore, the rate is so high for the industry as a whole as to call for careful study of general working conditions and more exact knowledge of the causes contributing to tuberculosis."

ACCIDENT HAZARDS

With reference to accident hazards the board finds that "owing to the great variety and intricacy of much of the machinery used, the speed at which it is often operated, the use of acids and poisons, and the intense heat characteristic of certain operations, the accident hazard in the metal manufacturing industry is comparatively high." The accident death rate, however, is lower than the average for all manufacturing and mechanical industries collectively.

Recognizing the importance of social conditions in the hours-of-work problem, the report says: "Output and health are, of course, not the only tests of the justification of any hours-of-work schedule. The broad social aspects of the problem as to the proper work-schedule are of great importance."

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Labor and Scientific Research

THE American Federation of Labor adopted the following resolution at its Atlantic City convention:

WHEREAS, scientific research and the technical application of results of research form a fundamental basis upon which the development of our industries, manufacturing, agriculture, mining and others must rest; and,

WHEREAS, the productivity of industry is greatly increased by the technical application of the results of scientific research in physics, chemistry, biology and geology, in engineering and agriculture, and in the related sciences; and the health and well-being not only of the workers but of the whole population as well, are dependent upon advances in medicine and sanitation; so that the value of scientific advancement to the welfare of the nation is many times greater than the cost of the necessary research; and,

WHEREAS, the increased productivity of industry resulting from scientific research is a most potent factor in the ever-increasing struggle of the workers to raise their standards of living, and the importance of this factor must steadily increase, since there is a limit beyond which the average standard of living of the whole population cannot progress by the usual methods of readjustment, which limit can only be raised by research and the utilization of the results of research in industry; and,

WHEREAS, there are numerous important and pressing problems of administration and regulation now faced by Federal, State and local governments, the wise solution of which depends upon scientific and technical research; and,

WHEREAS, the war has brought home to all the nations engaged in it the overwhelming importance of science and technology to national welfare, whether in war or in peace, and not only is private initiative attempting to organize far-reaching research in these fields on a national scale, but in several countries governmental participation and support of such undertakings are already active; therefore, be it

RESOLVED, by the American Federation of Labor in convention assembled, that a broad program of scientific and technical research is of major importance to the national welfare and should be fostered in every way by the Federal Government, and that the activities of the Government itself in such research should be adequately and generously supported in order that the work may be greatly strengthened and extended; and the Secretary of the Federation is instructed to transmit copies of this resolution to the President of the United States, to the President pro tempore of the Senate, and to the Speaker of the House of Representatives.

COMMENTS BY SAFETY ENGINEERING

This magazine approves organization on scientific lines to protect the people of the United States, also an efficient system for the information of the public concerning what is going on. The numerous, somewhat unrelated bureaus already in operation make too liberal use of the mails in sending out their bulletins. They mail too much stuff. Every editor's desk is inundated daily by a stream of bulletins. With the best of intentions to help along a good cause it is impossible for an editor, having other things to attend to, to keep track of what the various bureaus are accomplishing in comparison with what they have proposed. The present bulletin output is too stupendous.

Consideration for the welfare and longevity of editors, whose co-operation is sought constantly by all of the bureaus, would seem to require that a central publicity office be set up under the charge of an experienced editor whose job it should be to "boil down, down, down." Possibly a single bulletin, issued at frequent—not too frequent—intervals, could tell what is being done by the Washington welfare workers. Brevity is still a splendid strategy when it is sought to get things into print.

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Safety News and Comment

Society of Safety Engineers

FOR some years there has been in active existence the American Society of Safety Engineers, and, until the entry of the United States into the world war, meetings were held at regular intervals, and many papers of interest and importance were presented.

The regular meetings of this society have recently been revived and a strong sentiment was found in favor of enlarging both the membership and the work of the organization so as to make it rank with the big societies in other branches of engineering.

Just how wide the scope of the reorganized society should be, and just what should be the qualifications for membership, are matters to be discussed by a committee appointed at the last meeting.

The chairman of the committee on reorganization is H. W. Mowery of the American Abrasive Metals Company, 50 Church street, New York, and he will welcome suggestions in the work of reconstruction and future planning.

After the reorganization is perfected, steps will be taken to form local chapters in as many centers as will provide sufficient members. In some cities privileges can be granted members on the same reciprocal basis as obtains in the other engineering societies, such as the use of local engineers' clubs, libraries, meeting rooms, etc.

The prime requisite of membership in the parent body and the chapters is that certain engineering attainments or associations shall be related or directed to the safety of life and property.

One of the chief functions of the society will be the careful consideration and determination of technical safety engineering problems and helpful co-operation with legislative and other bodies advancing the cause of safety. The activities of this organization will be clearly distinct from the broader field of popularizing the safety movement so well carried on by the National Safety Council, and are especially needful in view of the fact recently published through the United States Department of Labor, that 65 per cent of all accidental fatalities and major mutilations are preventable by "engineering revision."

V. H. Manning, Doctor of Engineering

AT the commencement of the University of Pittsburgh, the honorary degree of Doctor of Engineering was conferred upon Van H. Manning of Washington, D. C., the director of the Bureau of Mines, Department of the Interior, in special recognition of his activities in aiding the winning of the war. The presentation was made by Dr. Raymond F. Bacon, director of the Mellon Institute, who said: "I have the honor and pleasure to present the distinguished director of the United States Bureau of Mines, Vannoy Hartrog Manning, for the degree of Doctor of Engineering. This distinction is most appropriately conferred upon Mr. Manning in recognition of his leadership of all work on the conservation of our natural resources. Possessing the highest executive ability, an authority on mineral technology, Mr. Manning has rendered inestimably valuable service to the nation in the development of the activities of our world-famed Bureau of Mines and in demonstrating to our industrialists and legislators that research is the basis of national development."

Libraries and Safety

AT the annual library convention, in Asbury Park, N. J., June 23-28, many librarians became interested in accident prevention and safety work. At the meetings of the Special Libraries Association, composed of librarians of business houses and those working in specialized lines, a number of papers were read and illustrated talks given on safety.

In an illustrated lecture on Americanization, Leslie Willis Sprague showed

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pictures of steel plants, metal working machinery and printing and woodworking machines with safeguards. Mrs. Gertrude Beeks Easly illustrated with lantern slides the work of the National Civic Federation. D. C. McMurtrie of the Red Cross Institute gave a spirited and realistic lecture on rehabilitation, and Mr. Deveneau of the Federal Board for Vocational Education spoke on the work of that organization. Miss Estelle L. Liebmann, librarian of the National Workmen's Compensation Service Bureau, read a paper on "Industrial Accidents and the Library's Share in Their Reduction." Miss Mary B. Day, librarian of the National Safety Council; Mrs. Mary R. Thomas, librarian of the Safety Institute, and Miss R. L. Keller of the Independence Bureau also attended the conference. Great interest in safety work was shown by many librarians and it is to be hoped that libraries throughout the country will soon pay more attention to safety literature than heretofore. The Asbury Park occasion was the first time in the history of the country that the safety subject was presented at a library convention.

Accidents on a Trolley System

THE Connecticut Company reports 8,784 accidents in 1918, against 10,144 in 1917. The company's figures:

			Number	
			1918	1917
1.	Car Collisions		496	363
2.	Derailments		685	909
3.	Collision with vehicles—			
	Motor driven	3,505		
	Horse drawn	471		
	Bicycles	58		
			4,034	4,232
4.	Collision with persons		259	285
5.	Defective equipment		139	137
6.	Boarding cars		275	488
7.	Alighting from cars		1,053	1,369
8.	Electric current—			
	Controller blow-outs	97	151	
	Station, line and car accidents other than controller blow-outs	182	132	
			279	283
9.	Shop accidents		211	194
10.	Power station accidents not due to electric current		50	37
11.	Track work		81	118
12.	Line, not due to electric current		157	160
13.	Injured or thrown while in cars		217	242
14.	Falling from cars		86	93
15.	Ejectments		100	111
16.	Doors, Guard rails and Windows		318	563
17.	Stealing rides		6	7
18.	Miscellaneous (other than above)		338	553
			8,784	10,144

Average number of accidents per day: 24 in 1918, 28 in 1917.

Kansas First Aid Meet

THE fifth annual Kansas State First Aid Meet was held on the athletic grounds of the State Manual Training Normal School, Pittsburg, Kansas, June 7, 1919. The event differed from previous ones in that there was no contest in first aid work, and there were no judges on the field. The teams simply demonstrated the first aid problems assigned to them. There were 104 persons on the field giving demonstrations of first aid work. Twelve one-man events and two team events were demonstrated. The miners were given printed programs showing the events and were allowed a certain length of time to demonstrate the problems.

A miniature mine tunnel had been built on the grounds, near the place where the first aid demonstration was given, and after the first aid work had been concluded an explosion was caused to occur which destroyed a portion of the tunnel, and miners equipped with breathing apparatus entered the tunnel, filled with smoke and noxious gases, in order to demonstrate how mine-rescue work was carried out in mine workings after an explosion.

In the evening following the contest or demonstration there was a banquet in the Normal School, with 400 persons present. Three to six minute talks were made by President W. A. Brandenburg, State Manual Training Normal School, Pittsburg, Kansas, toastmaster; W. D. Ryan, mine safety commissioner, United States Bureau of Mines; W. L. A. Johnson, commissioner, S. W. Coal Operators' Association; Alexander Howat, president, District No. 14, United Mine Workers of America; John H. Crawford, State Commissioner of Labor for Kansas; J. A. Fowler, secretary, Pittsburg Chamber of Commerce: W. P. Hawkins, president, Western Coal and Mining Company, St. Louis; W. T. Morris, inspector of mines for Associated Companies; Ira Clemens, president, Clemens Coal Company, Pittsburg, Kan.; Dr. J. J. Rutledge, United States Bureau of Mines, McAlester, Okla.; Joseph Fletcher, general superintendent, Jackson-Walker Coal & Mining Com-

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pany; Phil H. Callery, attorney at law, Pittsburg, Kan.; James Sherwood, assistant commissioner of labor (chief mine inspector), and William Harkes, general superintendent, Central Coal & Coke Company.

After the banquet the mine representatives of the various teams met and elected representatives to attend the National First Aid Contest at Pittsburgh, Pa., September 30-October 1, 1919.

Why Will Workers Be Careless?

THE report of the factory inspector of the Province of New Brunswick, Canada, shows a total of 102 accidents last year, of which 12 proved fatal. In considering the causes of accidents, the inspector emphasizes the fact that in many cases the sufferers themselves, or their fellow-employes, are to blame. Seven of the 12 accidents he ascribes to carelessness or inattention on the part of the victims themselves; while of the non-fatal cases, 23 occurred through the fault of those who suffered injury. At the same time, he does not excuse any failure on the part of the employers to observe every provision of the "Safety First" laws. He pointedly draws attention to the fact that serious accidents have been caused by attempts to clean machinery while in motion, which, except in the case of steam engines, is against the law. He calls for a more complete compliance with the law.

Recommended for Carnegie Medal

TO dive into 18 feet of water through the logs of a mill boom and to grope about on hands and knees on the muddy bottom of a swift flowing river for the drowning body of a venturesome boy is in keeping with the best life-saving traditions of the fire and police service. The feat was performed at Spokane, Wash., a few days ago and it took a fireman to turn the trick. The press of a State resounds with the fame of the hero of the incident, Captain W. A. Groce, assistant State fire marshal and a captain in the Portland (Ore.) fire department prior to taking on the wider duties of his present position.

The story is brief: A 17-year-old lad fell from the logs of a boom in the Spokane river into 18 feet of water. Word of the mishap was carried to No. 5 fire station, and Captain Groce, who was visiting the station, responded to the alarm. He dived twice and on the second occasion crawled around on the river bottom until he found the boy's body after two minutes' search. Coming to the surface with the lad, Captain Groce collapsed on the bank, but a physician had arrived and after half an hour's strenuous work the spark of life was revived in the half-drowned lad.

It was a strong man's deed well done. Captain Groce will be recommended strongly for the Carnegie medal.

Department of Public Works

FAR reaching changes in the executive machinery of the Federal Government were proposed in bills introduced in each house of Congress, June 25. The Department of the Interior will become the Department of Public Works, if the legislation proposed is enacted. The idea is to assemble all engineering activities of the Government in one department.

Such bureaus of the Interior Department as are non-engineering in character are to be placed under the jurisdiction of appropriate departments, while engineering bureaus from other departments are to be included in the Department of Public Works.

The Department of Public Works is slated to absorb the Supervising Architect's Office of the Treasury Department; the Construction Division, River and Harbor Improvements, Mississippi River Commission, and California Debris Commission of the War Department; the Bureau of Standards and the Coast and Geodetic Survey of the Department of Commerce; the Bureau of Public Roads and the Forest Service of the Department of Agriculture.

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 399 VARIOUS INDUSTRIES.—SELLING SAFETY TO THE CUSTOMER.—Of all the practitioners that have opened bare the anatomy of industrial hazards in quest of the cause of and the remedy for accidents, there have been none who have actually isolated the "bug" and prescribed the proper prophylactic. The writer is one of the many who advances an hypothesis with a revamped angle to it. But in this angle I hope to embrace and encourage what is not being given sufficient attention by safety schoolmasters.

It is not necessary to mention again the close relationship existing between the ethics of advertising and the profession of safety engineering. In fact, safety engineering is a form of advertising. It advertises protection against accident and disease and promotes good health. But the trouble with most safety advertising is that it is not followed out until the sale of protection is clinched. Listen here—

What good is it to advertise eye protection on a bulletin board and then fail to wait on your customers? By this I mean that 90 per cent of the concerns asking employes to wear goggles do very little or nothing to show the men *why* they should wear them. Oftentimes they do not even set the example that they believe in their own goods. First of all the foremen (who should be the star salesman of the safety organization) will probably subject himself to as great a hazard as the worker and yet will be found without goggles over his eyes. Or he seldom takes the time to make his men comfortable in their goggles.

Now there are many people who believe that some innovation in safety propaganda is the biggest means of creating a healthful atmosphere. But is it?

Supposing you were attracted by some novel advertisement regarding a piece of merchandise. And, continuing the supposition, what would the advertisement be worth to the advertiser if you and others that read the copy didn't know *where* or *how* to buy the commodity?

Now take the safety bulletin which goes before the employes. "Safety First," it reads. "Report any bruise or cut no matter how slight."

The average workman, especially the one on piece work, is up against the problem: "Is the cost of time taken out in order to have a small bruise taken care of commensurate with the saving from possible infection or other grave consequences?" Somebody has to personally sell him the idea that the investment of precautionary measures against infection is well worth the price. The foreman and his sub-foremen are the men to do this.

Here is what I believe needs more prodding. The foremen must be instructed how to sell safety before safety can be sold through bulletins. Personal letters from the safety director should be sent to these men regularly the same as a sales manager instructs his salesmen on the road. Let the foreman understand that the management is just as proud of the safety record of his department as it is of the care of the machinery or the turnout of product. Tell the foreman and his assistants how to make the employe comfortable in goggles or respirators; how to demonstrate how an accident might occur with certain machinery, thus bringing out the way to avoid the accident; to slacken on speed when it implicates danger, and to give the new man more personal attention on safety matters so as to insure a correct beginning.

In connection with this line of thought

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the following letter is presented which was used in one large plant for instructing the foremen on the "personal attention" item:

Mr. ..... Dept. .....

This is really the first chance I've had to write you, but I've been itching to get started for some time past.

You know, most people have the idea that a foreman or a gang boss can call the day's work a finished job when he has seen to it that production has been carried out to the "T." But by Ginger! The "T" is only one part of it all; add the word Safe to it and you have the boss's big side line, Safe-T (safety).

Fellows like you can count on a machine working pretty nearly automatic but those other machines—the ones with two arms, two legs, a head and the rest of the human anatomy—are the almighty important machines which have to be guided right. The boss that can steer his crew off the rocks of injury certainly has done a big day's work.

There are certain things we can do for the folks working here in the way of putting up safety bulletins but that don't finish the campaign by a long shot. We say, for instance, "Wear safety goggles." To follow up the dictum let's try to see that everybody's made comfortable when wearing "windows" over their eyes. The hot days will soon be here and I'll be hanged if I'd care myself to have some misfitting apparatus adding to my discomfort.

What can we do about it? Well, for one thing, try to give individuals enough attention to see whether they have got the best fitting goggles possible. Of course, we can't expect to give everyone a perfectly comfortable pair of goggles, but we can help a lot by suggesting proper methods of wearing the goggles and obtaining a different pair when necessary. One of the secrets of the success of the American gas mask was that every officer showed his men how to make themselves as comfortable as possible under the severe conditions of wearing the mask. The same thing should apply to safety goggles or any other similar equipment.

And that reminds me of something that happened the other day which has a pretty good point to it. A colored fellow, while working upon a scaffolding, carelessly dropped a brick on the head of one of the assistant superintendents. "Here, you fellow up there," roared the assistant superintendent, "you've dropped a brick on my head."

The colored fellow looked down.

"Oh dat's all right, Gov'nor," he yelled, "you all needn't trouble youself to bring it up; we've got plenty more here."

Now the point is this: Although fortunately not all workmen are as dense as this chap at seeing the reason for practising safety and the effect of unsafe practices, there are a number of men who should be given the *reasons* for taking protectionary measures for themselves and others. We have got to keep pounding "eye protection" into the mind of the fellow requiring goggles in his work; constantly reminding fellows who wear gloves near moving machinery *why* and *how* gloves are a danger trap; repeatedly explaining the object of safety guards on machines, and so on.

My intentions were not to dwell as long as I have on this subject but know you will agree with me on what I've said.

Yours for safety,
Chairman Safety Committee.

Just one other angle. I firmly believe that the employe should be instructed on safety outside of the plant as well as within. He should be sold on safety in the household or on the street for two very good reasons. First, it cultivates the safety habit which he carries to work with him. Secondly, it makes the employe an appreciative customer, for he realizes that the company must have his personal responsibility at heart. Many folks cannot help but contend that the idea of "Safety First" in the plant is a steel-minded form of company economy in the guise of kindly safety philanthropy. Hence propaganda regarding "safety after working hours" excludes any such misunderstanding between employer and employe.

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No. 400 THE CAUSE OF CARELESSNESS.—ALL INDUSTRIES.—It is generally recognized by those who have made a study of the matter that carelessness in the large majority of cases is the result of either a mental or a physical state of ill health. Either may be temporary, the mental condition often being merely a worry over finances, family sickness or the like, and the physical sickness a temporary malaise due to constipation, late hours or something similar. The writer believes that many preventable accidents occur to a workman who is in every sense of the words physically ill and should not be on the job.

Many of our larger industrial plants employ surgeons, nurses and attendants not only to take care of emergency cases arising from accidents and sudden illness, but also to furnish medical examinations of employes at stated intervals, to detect illness, either incipient or possibly of long standing, but hidden alike

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to the foreman and the workman because symptoms were not clearly evident. In this way incipient tuberculosis can be detected and the workman prevented alike from infecting others and prevented from allowing his disease to progress to such a point where he would no longer be of value. Many incipient cases of tuberculosis, through proper advice and treatment extending over only a few months, have thus been saved to industry. Tuberculosis, through the poisonous toxins liberated, affects the mind to a marked extent. This is true of many other diseases and conditions requiring the services of a physician to detect.

Unfortunately, while in many plants, particularly the smaller industrial units, every attention is given to the self-evident cause of accidents, no attention whatsoever is given to employes along the lines suggested. Not only, as stated, would such attention reduce accidents but it would also prove highly remunerative to employer and employe alike even though accidents were not more common to men half sick than to those whose faculties have not been interfered with through unrecognized illness. The smaller plants need not maintain a separate unit for such service for their employes. They could combine in such a way that medical examination and medical attention could be provided with a minimum of expense.

The writer realizes that such work is already being carried on in a limited way, but he believes that it should be universal and thus would result a smaller percentage of accidents and a greater output, with consequent advantage to employer and employe.

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No. 401 SAW MILLS AND SHINGLE MILLS.—Away out in the great Northwest, in the State of Washington, in the City of Everett, the writer, over two years ago, had the temerity to accept the position of safety engineer for several saw mills and shingle mills and, as far as I know, I have the distinction of being the first man in this State to hold a position dignified by the name of safety engineer.

I read the columns of SAFETY ENGINEERING with a great deal of interest, and I find that the problems of every safety engineer, wherever he may be, are practically a duplicate of the troubles I have had since accepting the position here. The kind of employment does not seem to make any difference. The problems of the safety engineer remain the same.

In order to qualify for this job a man must have the patience of Job and the diplomacy of a Wilson. He must be able to turn a double-backed somersault without ever taking his feet off the ground, and, in the meantime, look his employer squarely in the eye. I have found by experience that no two of them are alike. This difference also prevails among the foremen, so one must use patience and sweet oil with some, and the roughest kind of a file or baseball bat with others. One must be able to pray with some and swear like a pirate at others. One must never lose his patience nor get discouraged. All of these, and such as these, should constitute the mental daily text book of a successful safety engineer.

After a safety engineer has convinced the employer and the foremen of the importance of his work, both from a financial as well as a humanitarian point of view (and this must be done first) the real work of education among the men commences. This is a never-ending job, one that requires perseverance, tact and special qualifications in order to keep up enthusiasm among the men and the safety committees.

Our experience in the State of Washington shows us conclusively that very many accidents are caused by thoughtlessness or carelessness on the part of the employe or his fellow workmen.

To illustrate this: In a lumber company in this city, the employer, superintendent and foreman are earnestly enthusiastic over this work and have safeguarded that plant in every manner possible; in fact, I spent half a day in the plant recently, trying to find something to safeguard, and finally did find a set of rolls that should have had a guard in front of them. When I went to the foreman and told him, he reached up on a shelf and said, "Here it is; I have not had time to put it on." I mention this

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to illustrate how careful they are about safeguarding their machinery. Two days later one of the workmen, whose duty it was to do some repairing after the mill had closed down, had a pair of old shoes on, a half sole of which had become loose. He had been cautioned by the foreman, two or three times prior to the accident, to get his shoes fixed, but he neglected to do so. In climbing over a work bench he caught his damaged shoe on a piece of board and fell to the floor, knocking out four teeth, cutting a severe gash in his forehead and breaking a bone in the back of his hand. I simply tell this little incident to show that carelessness on the part of the workmen has, in this plant, spoiled a good record and is the constant and greatest problem of the safety engineer.

Prizes for May Articles

First Prize. No. 394. Richard B. Hoag, Universal Portland Cement Company, Buffington, Ind.

Second Prize. No. 395. R. S. Bonsib, Chief, Division of Safety Engineering, Working Conditions Service, United States Department of Labor, Washington, D. C.

Prizes for June Articles

First Prize. No. 396. F. M. Metcalfe, Superintendent of Safety Section, United States Railroad Administration, Railroad Building, St. Paul, Minn.

Second Prize. No. 397. Girard C. Varnum, Assistant Supervisor, Commonwealth Steel Company, Granite City, Ill.

Third Prize. No. 398. Honorable Mention. H. G. Hensel, Safety Inspector, Steel & Tube Company of America, Indiana Harbor, Ind.

Comments by Members of the Committees

Articles 394 and 395 are both splendidly written, but because they cover such different lines of safety thought, it does not seem justifiable to compare the one with the other. No. 394 gives some valuable suggestions to be carried out in the work of the switchboard operator. Article No. 395 certainly "rings the bell" when he says that safety is nothing more nor less than a sales proposition. I would say, let the contestants toss a coin for the prize.

Article 394 might have been condensed to advantage, but the ideas presented are good. They are, it seems, practicable and evidence an appreciable understanding of electrical hazards. I cannot at all agree with the author of Article 395 that "safety should be made a selfish proposition." Self interest may result in injury and death to many whose lives are equally or more important. It eliminates the heroic. And a little altruistic thought often averts accidents. Were a man made to feel that the well-being of the whole plant depended on him he would have reason and incentive to think and practice safety.

No. 396 is good and gives several views of safety work.

I vote for No. 397 for the reason that as the head implies, it covers all industries. It is a well written article and most helpful to the promoters of safety work in industrial plants.

I favor No. 396. I wish to say, however, that it is a perplexing problem to determine just which article is the best.

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I have selected No. 396 because the writer has so thoroughly and briefly defined the elemental and fundamental principles upon which successful safety organizations, propaganda and safety engineers must work, act and live to obtain the most effective results. The author of the article has cleverly summed up the entire situation in a nut shell.

I would say, however, that the authors of Nos. 397 and 398 should receive honorable mention for their splendid articles. In many ways they are on a par with No. 396. To read such articles is a real pleasure and an inspiration.

No. 396 is very well thought out and very well written, but it is applicable particularly to the railway industry.

Public Service Orders

THE Public Service Commission of Indiana is ordering transportation companies to install safety devices. In an order issued in the case of the petition of the city of Lafayette, the Fort Wayne & Northern Indiana Traction Company was instructed to install certain safety devices to reduce the possibility of accidents in Lafayette. The company was ordered to place derails on a hill where the lines cross the Wabash tracks on South Ninth Street. Other provisions in the way of sand-boxes on cars, and the keeping the street free from leaves were ordered. The city made the complaint because of accidents that have occurred.

Looks At You With Both Lamps. WHY?

The white spot seen on one lense is a splash of cast iron that landed when Semi Semele was "pouring off" in the foundry of the Gould's Manufacturing Company, Seneca Falls, N. Y. Mr. Semele is still seeing the world through two good eyes.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequietly. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

APARTMENT HOUSES

May 6, 1919. Columbus, O. 75 West Broad street. Stores, with apartments above. One 6-story building damaged. Walls, brick. Floors, wood. Roof, tin. Fire started on 2d floor, in rear. Discovered at about 11:40 p. m. Alarm, telephone. Duration, 2 hours. Killed, 9. Means of escape, fire escapes at rear, which were cut off by flames. Value of building and contents, $75,000, estimated. Property loss, $60,000, estimated. Browder life nets used to rescue 14 persons, who jumped from upper floors, but suffered no injuries.

CHEMICAL AND PHARMACEUTICAL WORKS

April 3, 1919. Lewiston, Ida. Chastian Drug Co. Main and Fifth streets. Basement and ground floor of one 4-story building damaged. Walls, brick. Floors, wood. Cause, explosion of chemicals. Fire started in basement. Discovered at about 11:30 p. m. Alarm, telephone. Duration, 6 hours. Stopped at ground floor. Means of escape, fire escapes. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $35,000.

CHURCHES

May 15, 1919. Grand Rapids, Mich. Trinity Methodist Episcopal Church. 118 Eastern avenue, N. E. One building damaged. Walls, frame. Floors, wood. Roof, shingles. Fire started in rear of organ. Discovered by janitor at about 6:42 a. m. Alarm, box. Duration, 1 hour. Stopped at roof. Value of building and contents, $20,000. Property loss, $10,500.

COAL AND LUMBER YARDS

May 13, 1919. Auburn, Me. Pulsifer & Young. 50 Railroad street. Dealers in wood and coal. Two 1- and 3-story buildings damaged. Walls, wood. Floors, wood. Roofs, shingles; slate. Cause, incendiary. Fire started in wood yard. Discovered by police at about 1:15 a. m. Alarm, telephone. Duration, 2 hours. Stopped at adjoining buildings. Persons in buildings, 32. Means of escape, fire escapes. Value of buildings and contents, $21,131. Property loss, $8,289.

June 4, 1919. Philadelphia, Pa. Charles S. Felin. Pier 42, North Wharf, Delaware river. Lumber yards. Fire started in lumber pile. Discovered by workman at about 5:47 p. m. Alarm, telegraph box. Duration, 3 hours. No further information reported to SAFETY ENGINEERING.

June 4, 1919. Portland, Me. Cash Fuel Company. 321 Washington street. Coal and wood business. One building damaged. Walls, wood. Floors, wood. Roof, wood. Discovered by citizens at about 4:19 a. m. Alarm, telephone. Duration, 10 hours. Firemen handicapped by delay in turning in alarm, and difficulty in locating blaze. Person in building, 1. Injured, 4 firemen. Value of building and contents, $205,000. Property loss, not reported to SAFETY ENGINEERING.

CONFLAGRATIONS

May 21, 1919. Mobile, Ala. Hamilton and Madison streets. Two hundred and eight 3- and 4-room cottages destroyed. Walls, frame. Floors, frame. Roofs, shingle. Cause, explosion of gasoline tank. Fire started in oil shed in grocery store. Discovered by passers-by and customers at about 3:25 p. m. Alarm, telephone and street boxes. Duration, 3¼ hours. Stopped at Charleston and Royal streets. Injured, 2. Value of buildings and contents, $450,000. Property loss, $315,000.

COTTONSEED OIL MILLS

May 4, 1919. Jackson, Miss. Southland Cotton Oil Company. Mill and Fortification streets. Oil mill. One 2-story building damaged. Walls, frame. Floors, concrete; wood. Roof, composition. Fire started in cottonseed hulls. Discovered at about 1:55 a. m. Alarm, box. Duration, 16 hours. Confined to building of origin. Injured, 3 firemen, by falling wall. Value of building and contents, $35,000, estimated. Property loss, total.

COTTON WAREHOUSES

May 21, 1919. Sylvester, Ga. Farmers' Warehouse. Isabella and Front streets. Cotton warehouse. One building damaged. Walls, brick. Roof, pine. Cause, engine. Fire started on platform near railroad. Discovered

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by passersby at about 11:45 a. m. Alarm, messenger. Duration, 3½ hours. Stopped by room adjoining platform. Value of building and contents, $312,000. Property loss, $50,000. Valuable papers and records protected.

DEPARTMENT STORES

May 23, 1919. St. Paul, Minn. Husch Bros. Dry Goods Store. 34-47 East 7th street. Department store. One 5-story building damaged. Walls, brick. Floors, frame. Roof, pitch, gravel. Fire started on 5th floor. Discovered by watchman at about 12:08 a. m. Alarm, box. Duration, 2 hours. Stopped at 4th floor. Private fire apparatus, hand chemicals. One fire captain died from injuries received. Means of escape, fire escapes. Value of building and contents, $400,000. Property loss, $80,000. Records and papers protected.

FERTILIZER AND ACID PLANTS

May 3, 1919. Linesville, Ala. Linesville Fertilizer Company. Talladega street. Cottonseed oil and fertilizer plant. Two 1-story buildings damaged. Walls, one, brick; one frame. Floors, wood. Roofs, iron. Cause, hot bearings. Fire started under floor. Discovered at about 6:30 p. m. Alarm, whistle. Duration, several hours. Persons in buildings, 15 to 20. Value of buildings and contents, $50,000. Property loss, $20,000.

June 3, 1919. Warren, Pa. Riverside Acid Works. Along Pennsylvania railroad right of way. Recovery of spent acid. One 1-story building damaged. Walls, brick and tile. Floor, concrete. Roof, composition. Fire started in storage room. Discovered by employe at about 10:40 a. m. Alarm, telephone. Duration, 3 hours. Stopped at boiler house. Fire was favored by lack of fire doors. Private fire apparatus, pumps, 2-inch hose. Value of building and contents, $22,473. Property loss, $3,484.

FLOUR AND CEREAL MILLS

May 14, 1919. Lincoln, Wash. Lincoln Flour Mills. Corner of Cody and Castle streets. Mill, engine room and warehouse damaged. Walls, lumber. Floors, lumber. Roofs, composition. Cause, overheated belt pulley into elevator. Fire started at top of elevator. Discovered by workmen at about 3 p. m. Firemen handicapped by lack of water. Persons in buildings, 4. Value of buildings and contents, $50,000. Property loss, $11,200.

FOUNDRIES AND MACHINE SHOPS

June 7, 1919. Manlius, N. Y. E. U. Scoville. East side of Fayette street. Machine shop. Two 2-story buildings damaged. Walls, stone. Floors, wood. Roofs, galvanized iron. Fire started in boiler room. Discovered at about 4:30 a. m. Alarm, telephone. Duration, 2 hours. Means of escape, fire escapes. No further information reported to SAFETY ENGINEERING.

GARAGES AND AUTO REPAIR SHOPS

March 24, 1919. Newburg, Ind. Dennison Auto Sales Company. Jennings street. Auto sales, repairs. Two 1-story buildings damaged. Walls, brick; frame. Floors, cement. Roofs, shingle. Cause, explosion gasoline. Discovered by neighbors at about 1 a. m. Duration, 3 hours. Stopped at adjacent building. Value of buildings and contents, $10,000. Property loss, not reported to SAFETY ENGINEERING.

HOSPITALS AND SANITARIUMS

May 4, 1919. Pontiac, Ill. St. James Hospital. 618 East Water street. One 4-story building damaged. Walls, brick. Floors, wood. Roof, slate. Cause, lightning. Fire started in elevator shaft. Discovered at about 4:30 a. m. Alarm, telephone. Duration, 10 hours. Stopped in same building. Fire was spread by false floors. Firemen handicapped by lack of water. Private fire apparatus, 3-gallon extinguishers. Persons in building, 25. Value of building and contents, $90,000. Property loss, $35,000.

HOTELS AND LODGING HOUSES

May 4, 1919. Ringling, Mont. Adams Hotel. Lot 14, block 2. One 2-story building damaged. Walls, frame. Floors, wood. Roof, wood. Cause, kerosene lamp. Discovered at about 9 p. m. Duration, 2 hours. Persons in building, 100. Value of building and contents, $6,000. No further information reported to SAFETY ENGINEERING.

June 9, 1919. Los Angeles, Cal. Portsmouth Hotel. 520 South Hill street. Cafeteria, and house fixture store room. One 3-story, basement, building damaged. Walls, brick. Floors, wood, Roof, wood and tar paper. Cause, believed incendiary. Fire started in basement. Discovered at about 7:37 a. m. Alarm, telephone. Duration, 2 hours. Stopped at 1st floor above basement. Persons in building, about 50. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $15,000.

HOTELS, RESORT

June 16, 1919. Dardanelle, Ark. Famous Summit Park Hotel. Resort hotel. Walls, frame. Floors, frame. Roof, wood. Discovered at about 11:30 p. m. Duration, 50 minutes. No fire department. Value of building and contents, $25,000. No further information reported to SAFETY ENGINEERING.

IRON AND STEEL MILLS

June 1, 1919, Bemidji, Minn., Bemidji Iron Works. 222 Park avenue. Welding and moulding. One 1-story building damaged. Walls, wood. Floor, wood and concrete. Roof, shingle. Cause, unknown. Discovered by passerby at about 1 a. m. Alarm, telephone. Duration, 4 hours. Stopped on same prem-

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ises. Value of building and contents, $7,000. Property loss, total. Papers and records protected in safe.

LAUNDRIES

June 8, 1919. New Glasgow, N. S. Globe Steam Laundry. South George street. One 2-story building damaged. Walls, wood. Floors, wood. Roof, wood. Discovered by night operator, telephone office, at about 3:30 a. m. Alarm, telephone. Duration, 2 hours. Value of building and contents, $20,000. Property loss, $15,000.

MANUFACTORIES, MISCELLANEOUS

May 9, 1919. Burlington, Iowa. Noelke-Lynn Manufacturing Company. Main and Oak streets. Manufacturers of mill work, doors, sash. One 3-story building. Walls, wood, iron clad. Floors, wood. Roof, iron clad. Cause, boy stepped on a match. Fire started on 2d floor. Discovered at about 7:40 a. m. Alarm, Gamewell box. Duration, 1½ hours. Confined to same building. Private fire apparatus, one line of hose. Persons in building, 8. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $9,220.

May 22, 1919. Cedar Rapids, Iowa. Douglas Starch Works. First street, 10th avenue, West. Starch manufacturing. Seven 5- to 8-story buildings destroyed. Walls, brick, concrete. Floors, concrete, wood. Roofs, gravel. Cause, explosion. Fire started in dry kiln. Discovered at 6:30 p. m. Duration, 48 hours. Confined to starch works. Private fire apparatus, hose. Persons in buildings, 125. Killed, 40. Injured, 50. Means of escape, fire escapes. Value of buildings and contents, $3,000,000. Property loss, total.

June 17, 1919. Philadelphia, Pa. Richard E. Tongue. Northeast corner Amber and Allegheny streets. Lamps and lamp supplies. One 3-story brick building damaged. Walls, brick. Floors, wood. Roof, tin. Fire started on 2d floor. Discovered at about 8:24 p. m. Alarm, telegraph box. Duration, 2 hours. Stopped at 2d floor. Private fire apparatus, extinguishers. Means of escape, fire escapes. No further information reported to SAFETY ENGINEERING.

MERCANTILES, TENANT BUILDINGS

May 23, 1919. Danville, Va. Dudley Block. Main and Union streets. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Fire started on top floor. Discovered by passerby at about 4:20 a. m. Alarm, alarm system. Duration, 3 hours. Stopped on same premises. Means of escape, fire escapes. Value of building and contents, $1,000,000. Property loss, $150,000. Records and correspondence lost.

MINING PROPERTIES

May 13, 1919. Chisholm, Minn. Oliver Iron Mining Company. One 1½-story building damaged; coal dock trestle, boiler house "C." Walls, wood, steel sheeting. Floors, concrete. Roofs, steel. Cause, sparks from engine. Fire started on coal dock. Discovered by hoisting engineer at about 6:30 p. m. Alarm, box. Duration, 5 hours. Private fire apparatus, 1 hand cart, 700 feet of hose, and 40-gallon chemicals. Persons in buildings, 2. Watchman died from effects of injuries. Value of buildings and contents, $60,000. Property loss, not reported to SAFETY ENGINEERING.

MISCELLANEOUS

April 22, 1919. Portland, Me. Grand Trunk Yard. Pilings, intended for use in rebuilding Grand Trunk bridge. Cause, children set piles on fire. Discovered at about 4:45 p. m. Alarm, bell. Duration, 4 hours. No further information reported to SAFETY ENGINEERING.

PLACES OF ASSEMBLY

April 9, 1919. Syracuse, N. Y. Turn Hall. 719-725 North Salina street. Meeting hall and motion picture theater. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Fire started on 2d floor. Discovered by passersby at about 10:30 p. m. Alarm, through fire alarm office. Duration, 3 hours. Persons in building, 10. Value of building and contents, $75,000. Property loss, $15,000.

PRINTERS AND BOOKBINDERS

May 9, 1919. Rentville, N. S. Advertiser Printing Company and other buildings. Main street and Church avenue. Printing office, restaurant, offices. One 2-story building damaged. Walls, wood, with brick veneer. Floors, wood. Roof, wood, covered with rubberoid. Fire started on 2d story. Discovered at about 11 a. m. Duration, 2 hours. Stopped at upper floors. Persons in building, 15. Value of building and contents, $16,000. Property loss, $7,000.

SCHOOLS AND COLLEGES

April 14, 1919. Philadelphia, Pa. St. Adalbert's Catholic Church, parochial school. Webb and Madison streets. School. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, incendiary. Fire started on 2d floor. Discovered at about 4:41 a. m. Alarm, telephone. Duration, 3 hours. Stopped at 3d floor. Means of escape, fire escapes. No further information reported to SAFETY ENGINEERING.

STABLES

May 17, 1919. Opelika, Ala. Wilson Brothers. South 9th street and Avenue B. Livery stables. Two 1-story buildings damaged. Walls, brick; wood. Floors, dirt. Roofs, metal; paper. Discovered at about 1:30 a. m. Alarm, messenger. Duration, 6½ hours. Stopped at adjoining building. Person in building, 1. Value of buildings and contents, $14,500. Property loss, $10,000.

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May 31, 1919. Detroit, Mich. Arctic Creamery Company. 182-196 Gibson street. Stables. One 2-story building damaged. Walls, brick. Floors, frame. Roof, composition. Cause, supposed, careless smoker. Fire started on 1st floor. Discovered by citizen at about 9:29 p. m. Alarm, street box. Duration, 2¾ hours. Stopped on same premises. Fire was favored by open runways to 2d floor, for horses. No further information reported to SAFETY ENGINEERING.

VESSELS

June 3, 1919. Philadelphia, Pa. Barge *Harold,* Pier 34, South Wharves. Fire started in hold. Discovered by employe at about 3:51 p. m. Alarm, telephone. Duration, 2½ hours. No further information reported to SAFETY ENGINEERING.

WAREHOUSES, PUBLIC STORES

May 10, 1919. Douglas, Ariz. Quartermaster's Department, U. S. Army. Outside of city limits. Store house. One 1-story building damaged. Walls, wood. Floor, wood. Roof, wood, roof paper. Cause, incendiary. Discovered by soldier on guard at about 10:05 p. m. Alarm, street box. Duration, 9 hours. Stopped on same premises. Firemen handicapped by lack of water. Private fire apparatus, 3 hand hose carts, 1 chemical. Value of building and contents, $150,000. Property loss, not reported to SAFETY ENGINEERING.

May 30, 1919. Boston, Mass. P. H. Graham Paper Company. 12-14 Ewer street. Waste paper storing and baling. One 1-story building damaged. Walls, wood and corrugated iron. Floor, wood. Roof, tar, gravel. Cause, incendiary. Discovered by citizen at about 12:45 p. m. Alarm, street box. Duration, 2½ hours. Stopped at stable, in rear. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $35,000.

WOODWORKERS

April 12, 1919. North Tonawanda, N. Y. George C. Meyer, Island street, near Island bridge. Planing mill. One 1-story building damaged. Walls, wood, stone wall partition. Floor, wood. Roof, wood, tar paper, gravel Cause, neglected electric motor. Fire started in center of mill. Discovered by watchman of firm near by at about 4:35 a. m. Alarm, box. Duration, 2 hours. Stopped in building of origin. Value of building and contents, $18,000. Property loss, $14,500.

April 18, 1919. Akron, O. Akron Lumber Company. 569 South Main street. Planing mill. One 2-story building damaged. Walls, brick, wood. Floors, wood. Roof, wood, rubberoid. Fire started in dry room. Discovered by fireman, coming home from trip, at about 3 a. m. Alarm, box. Duration, 4 hours. Confined to one building. Person in building, 1. Killed, 1. Value of building and contents, $38,000. Property loss, $28,000.

May 12, 1919. Phoenix, Ariz. Homebuilders' Mill. South First street. Planing mill. One 1-story building damaged. Walls, corrugated iron. Floor, wood. Roof, corrugated iron. Fire started in southwest corner of building. Discovered by passerby at about 6:24 a. m. Alarm, fire box. Duration, 2¼ hours. Stopped on same premises. Firemen handicapped by delay in turning in alarm. Value of building and contents, $10,000. Property loss, $6,800.

May 16, 1919. Portland, Ore. Menefee Lumber Company. Olive and Willamette boulevard. Shingle mill. One 1-story building and 4 kilns destroyed. Walls, frame. Floor, frame. Roof, frame. Cause, overheated dry kiln. Fire started inside kiln. Discovered by watchman at about 6 a. m. Alarm, telephone. Duration, 3 hours. Fire was favored by lack of fire stops in roof structure between kilns. Firemen handicapped by shingles piled to within 4 inches of sprinkler heads, and by logs in river, preventing approach of fireboat. Value of building and contents, $95,000. Property loss, $23,437.

May 23, 1919. Lowell, Mass. Hamilton & Hersey. Rockingham street, Wigginsville District. Shoddy mill. One 2-story building destroyed; 4 damaged. Walls, wood. Floors, wood. Roof, tar. Cause, picker machine. Fire started on 1st floor. Discovered by owner at about 3:53 p. m. Alarm, bell. Duration, 1½ hours. Stopped at cellar. Persons in building, 2. Value of building and contents, $18,313. Property loss, total.

June 2, 1919. St. John, N. B. Sayre & Holly Lumber Company. On river, at Chipman. Lumbering business. One 2-story building and large quantity of lumber destroyed. Walls, wood. Floors, wood. Roof, gravel, patent roofing. Fire started at 4 p. m. Duration, 20 hours. Stopped in center of lumber piles. Private fire apparatus, pumps. Value of building and contents, $90,000. Property loss, $56,000.

KILLED AND INJURED IN FIRES

April 18, 1919. Akron, Ohio. Akron Lumber Company, planing mill. One person killed.

May 4, 1919. Jackson, Miss. Southland Cotton Oil Company. Three firemen injured by falling walls.

May 6, 1919. Columbus, Ohio. Apartment house at 75 West Broad street, stores on ground floor. Nine persons killed.

May 13, 1919. Chisholm, Minn. Oliver Mining Company. Watchman died from effects of injuries.

May 21, 1919. Mobile, Ala. Two hundred and eight small dwellings destroyed. Two persons injured.

May 22, 1919. Cedar Rapids, Iowa. Douglas Starch Works. Forty persons killed, 50 injured.

May 23, 1919. St. Paul, Minn. Husch Bros. Dry Goods Store. Fire captain died from effects of injuries.

June 4, 1919. Portland, Me. Cash Fuel Company. Four firemen injured.

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Literature of Safety

Accident Prevention, Fire Prevention, Hygiene, Sanitation, Miscellaneous

MORTALITY STATISTICS OF INSURED WAGE-EARNERS AND THEIR FAMILIES. Experience of the Metropolitan Life Insurance Company's Industrial Department, 1911 to 1916, in the United States and Canada. Louis I. Dublin, Statistician, with the collaboration of Edwin W. Kopf, Assistant Statistician, and George H. Van Buren, Supervisor, Statistical Bureau. New York, 1919. 397 pages.

That branch of the public interested in vital statistics has long been accustomed to considering the excellent and reliable studies made by the statisticians of the Metropolitan Life Insurance Company to be of permanent value and a real contribution to the social history of this country. A company with 10,000,000 policyholders can throw light upon many hitherto unknown and uncertain facts.

The book, to a large extent, is a comparison between the experience of the white and colored policyholders and also between insured wage-earners as compared with the mortality experience of the general public as registered by the Census Bureau in the Registration Areas. Of interest is the following (p. 24): "Beginning with the age groups 25 to 34 years and thereafter there is a marked excess in the rate of mortality among insured (white) male wage-earners over that among (white) males in the general population. At these age periods the special stresses of adult life and of every employment in arduous labor make themselves felt in the mortality experience of males in an industrial life insurance company. Male insured wage-earners at the age periods 25 to 34 years show a mortality rate nearly 36 per cent in excess of the rates prevailing in the general population. The divergence between the two series of mortality figures increases somewhat in the next age groups, 35 to 44 years, to 58 per cent and then declines to 48 per cent between 45 and 54 years."

The death rate of insured wage-earners, as experienced by the Metropolitan Life Insurance Company, declined 6.8 per cent during the six years, 7.2 among white lives, 1.4 per cent among colored lives.

The comparisons between the white and colored lives are extremely enlightening. Of the total number, 635,449, the colored amounted to 115,370. Mr. Dublin says that this is the first time a comparative mortality study of the two races has been made in which the conditions were not utterly disproportionate. In this case both were wage-earners and could be classed together as such. Comparisons are made in every instance by color, sex and age. In the entire group of white persons the death rate was 11.04 per 1,000 exposed, colored persons 17.22 per 1,000 exposed.

The chapter on external causes of death (chapter VIII) deserves special attention. It includes deaths from accident, suicide and homicide. Out of the total number there were 50,712 fatalities from violent causes. We may better realize the carnage produced by accidents in the United States and Canada when we see these figures. The accident rate per 100,000 for males in the registration area is 139.6, among insured wage-earners (males) 154.3; the rate in England and Wales (males) is 62.4. This chapter, if no other, should be carefully read by everyone in the safety field.

The discussions and tables of death due to various diseases take up more than one-half of the book. Of particular value are the statistics of the diseases of middle life—Bright's disease, cancer, arteriosclerosis, etc. To quote again: "It is evident that there was a sufficient number of lives exposed in this inquiry to warrant drawing reliable conclusions. This mass of data, considered in relation to wide geographical distribution, its special application to the wage-earning group of the population, its substantial characteristics as to color, sex and age classes and the completeness of the registration of the fact is, in our opinion, unparalleled in the history of American vital statistics."

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WORKMEN'S COMPENSATION BOARD, ONTARIO. Report for 1918.

This report covers the 4th year of the operation of the Workmen's Compensation Act. It exceeds any prior year in number of accidents, cost of compensation and volume of industry. The total number of accidents reported was 47,848. $3,514,648.47 compensation was awarded, but this is not complete. $369,346.37 was paid for medical aid under Schedule I, which shows insurance under the assessment plan. Schedule II lists the accidents coming under the self-insurance plan. The report also gives the final figures for 1917 and a yearly comparison for the four years of the operation of the act. The woodworking industry has received special consideration in Chapter VI. This chapter contains a statistical study of accidents in the woodworking industry, giving assessment rates for four years and details of accidents as to causes and number.

THE PRINCIPLES AND PRACTICE OF SAFETY. A Handbook for Technical Schools and Universities. Chicago. The National Safety Council, 1919. 72 pages.

The National Safety Council has for some time been making a study of technical courses and the inclusion or omission therefrom of safety principles. To quote from the foreword: "Safety is rather a new way of looking at the very old subject of production. If the modern engineer must know something about production as well as design, then surely he must know how to produce efficiently and economically—therefore safely. From these easily demonstrable premises, many engineering educators have drawn the conclusion that engineering students should be instructed in the fundamentals of modern accident prevention."

This pamphlet is the first endeavor to lay before the engineering instructor and student the fundamental principles of safety. It is full of suggestions and the many references given for further study are particularly valuable. The book is divided into two sections, Safeguards and Safe Practices in School Shops, and a Syllabus of Lectures. Each subject has been dealt with by an authority. A copy should be in the hands of every engineer, student engineer and instructor, and the information should also be of value to insurance inspectors.

PLANNING THE INDUSTRIAL PLANT. Hugh M. Wharton. *Industrial Management.* June, 1919.

This is the first article of a series by a consulting engineer. The articles will aim to give the proper types, layout and equipment for various kinds of manufacturing plants but will not include any processes. Mr. Wharton, in his first article, presents five essential requirements to be fulfilled in measuring the fitness of any general plan for an industrial plant:

1. Proper accommodation for the machines that are to be installed.
2. Provision for handling and transporting material at a minimum cost.
3. Provision for extending the plant without serious disturbance of the established manufacturing routes.
4. Arrangement for reasonable subdivision to prevent the spread of fire.
5. Proper accommodation for the workers.

A number of illustrations and diagrams accompany the article.

FIRES AND ACCIDENTS IN CHEMICAL PLANTS.

The *Journal of Industrial and Engineering Chemistry* publishes in every number a list of fires and accidents in chemical plants under the caption "Works and Laboratory Accidents." The accounts contain causes as far as ascertainable and preventive measures.

NATIONAL FIRE PROTECTION ASSOCIATION. Twenty-third annual meeting.

Proceedings of the twenty-third annual meeting of the National Fire Protection Association, Ottawa, May 6, 7, and 8, may now be had in completed form, having been distributed to members. An account of the meeting appeared in SAFETY ENGINEERING for May.

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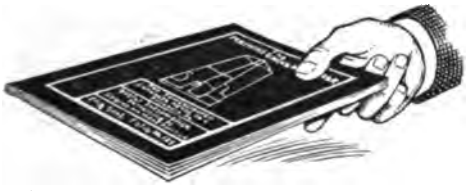
MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

HOW STEELCRETE IS USED

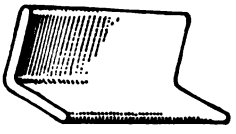
Steelcrete mesh, the product of the Consolidated Expanded Metals Companies, Braddock, Pa., is being extensively used by safety engineers and industrial executives for guarding purposes around machinery of every design and conception.

"The Machine Guard Hand Book" recently issued by this concern tells in a very interesting way, how Steelcrete is used for ma-



chine guards. The perusal of this book is intensely interesting even to those who are not in immediate need of guards.

The following digest of typical details of guard building with Steelcrete and Steelcrete accessories is sure to interest every safety engineer. On account of the ease with which the filler material may be attached, most machine guards are constructed using angle-iron frames. Soft steel angle-iron should always be used. Re-rolled material or angle-iron of a structural grade is hard to cut and cannot be easily bent or curved. The mesh may be attached to the angle-iron using Steelcrete clips, and No. 6 rivets or 3/16-inch stove bolts, or by a ¾" x ⅛" flat riveted or bolted every 10 inches spaced a few inches apart.



Angle Iron

Frames constructed of angle-iron should be curved to follow the profile of the guarded parts. The bending can be accomplished without heating, sharp angle bends are secured by cutting a mitre out of the inner leg of the angle. In certain States the minimum size and weight of angle-iron for use in guard construction is established by law. For information on State Standards the reader should send for the "Power Transmission Code," Bureau of Inspection, Department of Labor and Inspection, at his State capital.

Cutting "Steelcrete" Mesh to Size From Large Flat Sheets

Steelcrete clips are special shaped washers, designed for attaching mesh to angle-iron frames. The advantage of clips over continu-

Reverse Side of Frame Showing Angle Iron and Clip

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ous flat for attaching mesh is that when clips are used the labor of matching the spacing of holes is eliminated. "U" edging is another useful accessory, it is designed to fit over the edge of Steelcrete mesh, forming a stiff metal edge or frame. "U" edging is used extensively for

Fastening the Mesh to the Frame

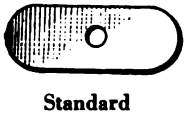
frames for small doors and for framing panels and edges of mesh where otherwise the sharp edges would be exposed.

The Steelcrete splice-bar, manufactured in a special pressed shape from 20-gauge steel, is designed for use in neatly joining mesh to mesh or mesh to sheet metal in the "U" shaped recesses at either side. After the mesh is inserted the splice bar is hammered down solidly over the mesh to provide a "grip."

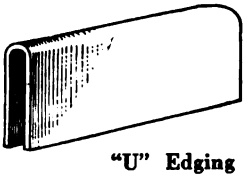
The Steelcrete floor socket is a simple, light and durable device. The idea of the floor socket, of course, is to provide a method of attaching angle-iron uprights to the floor in such a way that the guard may be removed and returned to its original position quickly, thus avoiding the danger that it may be set on the machine so that it will not be in its correct position when the machine is put in operation.

Angle-Iron Frame With Splice-Bar Cross Members

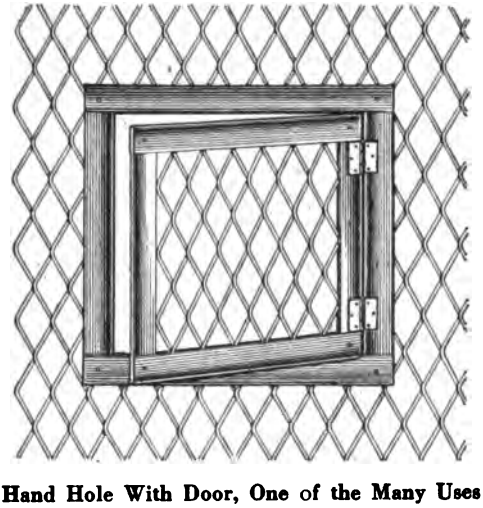
"Jumbo" Steelcrete Clip



Standard "Steelcrete" Clip



"U" Edging



Hand Hole With Door, One of the Many Uses of "U" Edging

"Steelcrete" Floor Sockets

A HANDY BOOKLET

Bulletin No. 2 of "Safety Service" externally operated switches has been issued in a pocket edition by The Trumbull Electric Mfg. Co. of Plainville, Conn.

The illustrations and tables have been photographically reduced, so that the book is easily read and at the same time most condensed in size.

The "Circle-T" line is constantly widening and now embraces a type applicable to every switch requirement.

The booklet should be in the desk or pocket of every safety engineer.

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A MERGER OF NORTON INTERESTS

At the annual sales conference of the Norton Company, which was attended by Norton men from all over the world, it was announced that: "The conduct of the business of the Norton Grinding Company, manufacturers of grinding machines, has been taken over by the Norton Company and hereafter the grinding machine and grinding wheel business will be conducted as a single enterprise under the name of the Norton Company.

"The Norton Company has for some years owned practically all the stock of the Norton Grinding Company and the directors of both companies have been the same, so that the policies and methods of business were practically the same.

"The business of both companies has reached such a volume and spread to such an extent in foreign countries that there seems to be many advantages in conducting the grinding machine and grinding wheel business as a single enterprise.

"In meeting this change and in planning for the larger success of the combined business of the two companies some reorganization has taken place in the active executive officers of the Norton Company.

"George I. Alden, who has been president of the Norton Company since the death of Milton P. Higgins, its first president, will be chairman of the board. He will still give the company the same untiring, faithful and efficient service which has contributed to the success of the business in the past.

"Charles L. Allen becomes president and general manager, Aldus C. Higgins treasurer and general counsel, and George N. Jeppson secretary and works manager.

"Two new offices of vice-president have been created, one to be filled by W. LaCoste Neilson, vice-president and foreign manager, the other by Carl F. Dietz, vice-president and general sales manager.

"The board of directors is not changed and consists of the following: George I. Alden, Aldus C. Higgins, John Jeppson, Charles L. Allen, George N. Jeppson and R. Sanford Riley.

"Under Vice-President Carl F. Dietz will be conducted the sales departments of both companies, Herbert Duckworth being sales manager of the grinding wheel department and Howard W. Dunbar sales manager of the grinding machine department.

"C. O. Smith assumes the newly created position of consulting sales engineer to Mr. Dietz. Henry Duckworth is controller of the reorganized company.

"Formal announcement was made of the establishment of a factory in Japan and foreign sales agencies in several foreign countries which Mr. Neilson has frequently visited during the last few years and with whose conditions he is personally familiar.

"Announcement was also made of the decision of Ross C. Purdy to leave the exclusive employ of the Norton Company to become consulting engineer with headquarters in Buffalo. The Norton Company has, however, been fortunate in retaining Mr. Purdy's services in the abrasive and refractory fields exclusively and he becomes consulting ceramic engineer for the company.

Lewis E. Saunders of Niagara Falls, N. Y., manager of abrasive plants, will shortly move with his family to Worcester, conducting his former duties as well as those of research engineer from his office at the main works in Worcester.

"The sales force of the Norton Company who have gathered this week are enthusiastic about the prospects and opportunities for the future. They report increasing business in their various territories and the general feeling is that if American industry will only make the best use of its opportunities now, an extended period of prosperity is before us."

INGENIOUS NEW SWITCH

A new locomotive headlight switch has recently made its appearance. It has a number of features that will quickly appeal not only to the master mechanic, but to the engineer.

This Crouse-Hinds headlight switch is a self-contained, dust-tight switch that will effectively take the place of a double-throw knife switch for dim and full light, and a momentary contact switch for temporary dim light.

With an easy push the handle goes from "Off" to "Dim," and another slight push sends it to "Full." Going into "Dim" before going into "Full" gives the filament a chance to heat before coming to full glow. That means a longer life for lamps.

While passing another locomotive or for picking up signals it is not necessary to bring the switch back to the "Permanent Dim" position. The engineer merely pushes the handle from "Full" to "Temporary Dim," holding it until he has passed the other train or the signals when he releases the handle and the switch automatically snaps back to "Full."

If going through a yard or a city where the headlight must be "Dim," a slight lift of the handle brings the switch back to the "Permanent Dim" position.

This handy little switch can be mounted any place in the cab that is suitable. Mechanism cannot get out of order. The internal spring and the stops on the cover insure proper location of switch at position desired and makes it impossible for the switch to stop between positions.

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AN AFTER WAR DEVELOPMENT OF A WAR TIME PRODUCT

Gas warfare, owing to its deadly character, called for immediate combative measures, which resulted finally in the development of the army type of gas mask.

The English type of mask, after which the American type was modelled, consisted of a canister in a haversack, equipped with a face mask having a mouthpiece and nose clip. These were unsanitary and uncomfortable, yet they enabled the Allies to successfully withstand every gas attack.

A later development was equipped with a new form of face mask, eliminating the mouthpiece and nose clip and substituting clarifying tubes. These tubes, by causing the incoming air to pass up over the eye pieces and back down over the face, served a two-fold purpose, in that they prevented moisture condensation from forming on the eye pieces, and by evaporating the perspiration, they keep the face cool.

After the signing of the armistice, the developments that were made along these lines, theretofore closely guarded, were made available for industrial purposes, and a new ammonia gas and fume mask, known as Double Absorbits, is the direct result.

In gas warfare, the percentages of the gas in the air were very low, owing to the enormous dilution by the air currents before it actually reached the Allied armies, and one canister was sufficient for many hours. In industrial work, it has been found that the concentration of gas in the air might in some cases run very high, consequently the second canister was added, with means provided for using either at the option of the wearer, they being connected by a two-way valve, provided with a pointer which indicates which way the air courses are open. Manufactured by Protecto Safety Appliance Co., Newark, N. J.

SAFEGUARDING FREIGHT ELEVATOR ENCLOSURES

The requirements for a safe freight elevator installation are generally recognized to be, (a) fireproof construction of the hatchway itself, (b) a modern machine, with proper safety appliances, (c) proper protection for the openings through which access to the elevator is had.

As for point (a), old shaft-building methods (which consisted of cutting holes in the floor and putting a sort of fence about them) have entirely given way to the modern fireproof construction. The vigilance of building departments prevents unsafe work here. And (b) every elevator machine worthy the name on the market today is equipped with a reliable safety device. The buyer can hardly go wrong on this point. Keen competition among elevator makers tends to the development of safer machines. It is a fact, moreover, that of all the accidents chargeable to elevators by far the minority (from 10 to 15 per cent.) are in any way the fault of the machine. The greater part of them can be laid at the door of (c), inferior equipment at the openings to the hatchway.

This equipment can be divided into two classes; that which is located on the outside of the hatch and includes side-sliding and swinging doors; and that which operates on the inside of the well between the car and the wall. This latter includes Peelle type counterbalance and Telco type two-piece vertical sliding doors, as well as single leaf vertical sliding doors.

It is not advisable to employ doors of the sliding or swinging type at freight elevator openings, because they must be constructed heavily to comply with fireproof requirements. Their design is such that they cannot be operated easily, and the multiplicity of attachments which are to increase the safety of the doors also increases the amount of labor required to operate them. They require space for operation which could be more effectively used.

Before the introduction of Peelle counterbalance truckable doors, it was the custom to equip the elevator shaft, in addition to the fireproof doors, with elevator "safety" gates. These were flimsily constructed of wood, and while no doubt their moral effect on the human mind was good, they offered little real resistance to the impact of heavily loaded trucks, automobiles and swiftly moving humans. Their propensity for getting out of order is well known to everyone whose experience extends beyond a few years back. Then, too, they offered no resistance to the spread of fire. If obstructions such as were only too likely to be placed in the path of the fireproof doors prevented their closing, fire once having gained headway, used the elevator shaft as a flue giving access to the entire building. The installation of firedoor and safety gate equipment, it will therefore be seen, is fairly costly in the first place, and its ultimate cost may be many times that of efficient opening protection.

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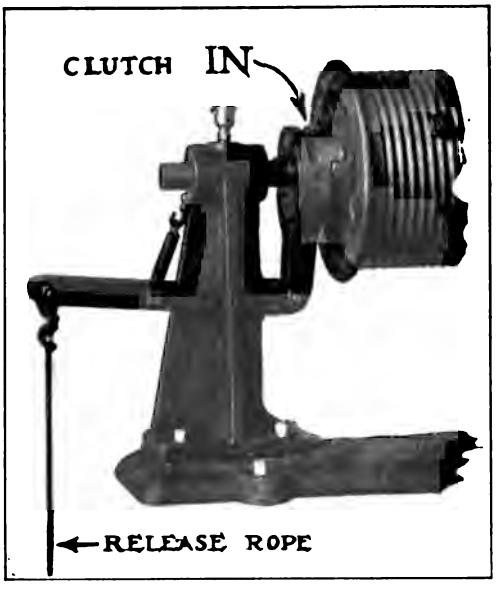
There remain the doors which operate on the inside of the hatch; the best doors of this type are (a) accident proof—all openings in the shaft except the one at which the car is standing are closed; (b) fireproof—for the same reason, and the further one that a double thickness of door keeps fire from penetrating from one floor to another; again there can be nothing to prevent the closing of fuselink actuated doors; (c) strongly constructed, since it must often resist great shocks successfully; (d) there must be no gap between the car and the building sill when the door is open; (e) provision for trucking heavy loads from building sill to car *must* be made; and (f) the door must be equipped with a device which will insure that it must be closed before the car can be taken from the floor.

Not every door of the counterbalance or vertical sliding type meets most of these conditions. In fact, the one make in which these advantages are most conspicuously combined is that of the Peelle Company of Brooklyn, N. Y. The counterbalance door made by them admirably fulfills the conditions we have outlined. To take them up in detail, (a) Peelle doors are nearly two inches thick, and are guided in their movements by heavy shoes running in steel angle tracks which are securely bolted to the wall;. (b) they are fireproof as well, the labels of the Underwriters' Laboratories attesting to this fact; (c) there is nothing flimsy about their construction; every part is oversize and designed for loads far in excess of any it will ever be called upon to bear; (d) and (e) the Peelle patented truckable sill is the only device which perfectly fulfills these two conditions—no other counterbalance door can even approximate them. The Peelle Company is the owner of basic patents covering the "trucking bar," without which counterbalance doors are valueless. This bar is incorporated into the upper edge of the lower panel, and when the door is open, rests on solid stops at each side. This effectually supports both the door and all trucking loads. Careful designing and special construction of the bar render it capable to support over ten tons' weight.

Under the head of (e) we consider switch mechanisms to break the operating circuit of the elevator car or to actuate auxiliary electro magnetic devices which either mechanically grip the control-rope or break one or more main lines to the motor. The usual switch of this type is not designed for the hard usage it is to receive in the freight elevator hatch, and replacements are frequently necessary. Peelle safety switches are strongly constructed and meet the approval of all labor departments, and all departments local or otherwise, having jurisdiction.

Under this head also may conveniently be considered the latest development in the freight elevator door line, the Peelle automatic electric operating machine. This is the means of operating all Peelle doors more efficiently, quickly and safely than has been possible heretofore. The turning of a switch located on the elevator car is the sole effort needed to open and close



Peelle Automatic Machine Clutch in Position for Machine Operation

the largest doors, often more than a ton in weight. The natural advantages of Peelle manually operated doors are increased a hundred per cent when this machine is used in conjunction with them.

A unique feature of the device is the auto-

Peelle Automatic Machine Clutch. Disengaged for Operating by Hand. A Simple Pull on the Rope Releases the Clutch

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matic safety stop. To open or close the doors, it is necessary to bring the switch to the proper position and *hold it there*. Assume that the door is closing, and that the bane of safety engineers, the "cheerful idiot," attempts to worm his way through the fast decreasing opening between the two leaves of the Peelle door. He is not likely to, as the door closes in less than five seconds from the turning of the switch, but suppose he does. The operator immediately yells, "Look out!" and with his hands motions the intruder away; probably even pushes him away. The moment the elevator man removes his hand from the switch, the motion of the doors is stopped automatically. It is obvious that there can be no fatal accident under those conditions. Even if the victim is caught between the doors (a practical impossibility) he can be extricated without trouble, because the door can be moved in either direction from any point (except the limits) without the necessity of its completing the original motion. It will be agreed that the safeguarding of human lives from the consequences of their own *carelessness* can be carried no farther than this. The fact that the operating machine can be disconnected from the doors in an instant by pulling a lever (from the elevator car) leaving them evenly balanced and in perfect condition for hand operation will appeal to engineers particularly.

Peelle Full Automatic Machine

A master electric interlock, located in the penthouse free from interference by the elevator operator, is provided to insure that the doors be closed before the car can be started. The safe operation of the system is, therefore, not dependent on the human factor; while the careful operator is the rule, we must provide for the exception.

Occasionally there will arise conditions wherein Peelle counterbalance doors cannot be used. For example, sewer pipes, footings, or other constructions may prevent allowing the necessary amount of space below the sill for the passage of the door. In cases like these, the next best door is the Peelle Telco two-piece vertical sliding door, or the single vertical slide type manufactured by the same people. These are counterweighted doors and when equipped with the Peelle interlocks are as safe as they can possibly be made. They can also be used in conjunction with the Peelle automatic operating machine, and when so used are nearly equal to the counterbalance type. The latter is superior in that no counterweights are needed and that the full opening is afforded in the time required to uncover half of it.

The experience of twenty years of unremitting toil for improvement is behind every Peelle door. The manufacturers have kept step with all the progress made by the building trade, and in the introduction of their full automatic machine have anticipated the trend by a few years.

Recognizing that the conservation of man power is of paramount importance in these times, the manufacturers believe that the standard freight elevator door equipment of the future will consist of the Peelle counterbalance door supplemented by their automatic operating machine. Not only does this combination increase the efficiency of the elevator system and guard the property from fire—above all, it eliminates one of the greatest dangers to the safety of the employes working about the elevator shaft.

STEEL EQUIPMENT

Protection against fire in storage bins and filing cases, and safety from disease and vermin in clothes lockers are generic advantages possessed by all makes of steel shelving and partitions, but from a study of Catalog No. 7, just issued by Terrell's Equipment Co. of Grand Rapids, Mich., this concern has introduced refinements in both design and construction which gives to its product many advantages.

The unit idea of assembling stacks is carried out, and when the material is shipped in knock-down condition, detailed instructions are furnished for easy erection.

Some of the interesting details shown in this catalog are the pitch roof locker, which affords no chance for accumulation of dirt or trash; stock room shelving fitted with doors, steel tables to match locker installations, and improved provisions for locker ventilation.

A SAFETY DEVICE FOR PNEUMATIC DRILLS

The Pneumatic Safety Tool Company, Boston, Mass., is marketing a safety device for pneumatic drills. This device which is known as Safair is attached to the machine and the air hose is then attached to it. Its purpose is to shut off the air from the machine, when the cutting tool jams, or for any other reason is set back by abnormal resistance. The manufacturer claims that this device will prevent accidents and injury to the operator, will prevent jamming and kicking, and will reduce cost of cutting tools to a minimum.

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THE MODERN USE OF DRINKING FOUNTAINS

The photo of the "Glauber Practicool," as installed in the large manufacturing plant of the White automobile factory at Cleveland, shows the modern methods of today in providing factory help with cooled water during the summer months. It is a well known fact that during the hot days of the summer the heat saps the vitality of the workman and production falls off and factory costs advance. There is nothing better than a cool drink of clear water to quench the thirst, and by keeping the workmen supplied with an adequate amount of cooled water, it satisfies their thirst, and it also satisfies their minds, and in this manner they go back to their machines refreshed, and turn out more work than if they have that wilted feeling, that seems to overcome most of us during the scorching hot days.

Welfare workers in all large manufacturing plants seem agreed that keeping the workmen satisfied and contented does more to increase production than modern machinery, and with this thought in mind the modern hygienic engineer of the large factories will immediately recommend cooled drinking water, from modern drinking fountains, and a sufficient number of drinking fountains so that it is not necessary for the employe to walk three or four hundred feet to get a drink of water. By placing these fountains so as to make them convenient for every twenty-five or thirty men, there is very little time lost in walking to

and from the drinking fountain, and in this manner the workmen are kept contented and on the job even during the hottest summer weather.

The other photo shown is a picture taken of the Rosenbloom Credit Clothing Co., of Cleveland, and represents the thought of a modern up-to-date tradesman, who believes in making his customers contented, and employs the same method as is used in the factories to satisfy workmen. The prospective customer in a contented mood is much easier to sell than the customer who is thirsty and tired out, and in this condition they really do not feel like looking at material, whereas, after taking a drink of cooled water, the customer is in a contented mood, therefore, making a more prospective buyer. Consequently, this tradesman has adopted modern methods of satisfying customers before attempting to sell him, by the installation of a sanitary drinking fountain.

There are many types of drinking fountains on the market, but from the above illustration you will note that this is an ice-cooled fountain, that has a refrigerating device that cools the water without the ice itself coming in contact with the water, and eliminating the old complaint that many of us suffered with years ago, when it was the common practice to drop a cake of ice into the water so as to serve ice water. After several drinks of ice water of this kind, many of us were affected with cramps which in many instances were worse than the parched feeling before taking the drink.

Modern science has shown that the man who drinks plenty of water is usually the healthiest individual. Medical journals time and again recommend that every person drink at least two quarts of water per day. Many of us never give this a thought except in hot weather, whereas, an attractive drinking fountain when installed seems to invite you to take a drink almost every time that you pass it, and in this manner the installation of a modern drinking fountain reminds us of the fact that we should drink more water, and by so doing we create a healthier condition than before. Look at the man who drinks plenty of water and you find a healthy man; install drinking fountains in factories, and you will have a healthier class of employes. Does it pay? Ask any large employer who has installed drinking fountains, and he will answer that it is the best paying proposition that was ever installed.

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THE LA FRANCE-YABLICK SMOKE AND GAS MASK TESTED BY FIRE EXPERTS

Members of the Associated Factory Mutual Fire Insurance Company, American-La France Fire Engine Company, National Board of Fire Underwriters, and the New England Insurance Exchange conducted very extensive tests of gas masks and smoke protectors at the test laboratory of the Factory Mutual Company on the Baldwin Estate in North Woburn recently. They were assisted by Chief Tracy of the Woburn Fire Department and several of his men.

The tests of the masks and protectors were conducted as follows: As each different smoke substance was used, a different fire was made up and then the laboratory was completely filled with the smoke. The men with the masks and protectors on entered the building and the time each man remained in the building was recorded. The different smoke substances used were as follows: Cotton, excelsior, loaded daub (the constituent of the first finish for patent leather), ammonia, carbon tetrachloride and cutting oil (resulting in freeing of chlorine gas), carbon tetrachloride, cutting oil, and water (resulting in freeing of hydrochloric acid gas), green feathers and woolen rags, and sulphur and tar.

The gas masks used were the K. T. army masks, with one exception. Lieuetnant M. Yablick, expert for the American-La France Company, formerly with the Chemical Warfare Bureau in the Research Division, wore a mask which he designed and patented himself. The mask itself was similar to the army masks, but the chemical compound used in the canister was a compound reacting against ammonia fumes. This mask is known as the ammonia gas mask and was for the use of the workers in the munition factories where nitrogen was employed. With this mask on the workers could withstand the strongest gases for two or three hours. Lieutenant Yablick also invented a combination ammonia and smoke mask.

In the ammonia smoke test, which was the worst one of the series, several men, including Chief Daly of Brockton, Mr. Buchanan, Lieutenant Yablick and Lieutenant Gendron of Manchester, wore the Yablick combination mask, and upon coming out stated that they felt no ill effects at all and could have stayed in indefinitely. The ammonia fumes, however, entered the K. T. army masks and rendered the compounds in the canisters useless.

The all-round usefulness of Lieutenant Yablick's masks made it the first choice.

CATALOGS WANTED

Mr. T. W. Osgood, Assistant Superintendent Department of Safety of the Industrial Accident Commission of the State of California, is enlarging his catalog, filing and card-index system and would be pleased to receive available catalogs covering industrial machinery, equipment, appliances and processes. Communications may be addressed to Mr. Osgood, at 423 Union League Bldg., Los Angeles, Cal.

FYR-FYTER

Fyr-Fyter, a one-quart hand chemical extinguisher, that was called upon by our Government during the war to fill the largest contract placed for extinguishers of this type, operates upon an entirely original principle. The pump embodied in the extinguisher forces air into the pressure chamber containing the extinguishing fluid, and this insures a steady, continuous stream from the first stroke of the pump, with the added advantage of greatly increasing the pressure or force behind the stream by pumping vigorously. For careful aiming, pumping may be stopped for appreciable periods and the compounded pressure will continue the stream without a pause.

The use of the air pressure, instead of the direct piston pressure upon the extinguishing stream enables Fyr-Fyter to be sealed when not in use. This is a distinct advantage, as the loss of liquid and deterioration of contents through the ordinary "breather cap" is thereby entirely eliminated.

Fyr-Fyter has enjoyed the distinction of being a "Panic-proof" Extinguisher. This is due to its simplicity of construction and operation, its reliability, and the use of an operating handle which turns in either direction. People excited by a fire do not remember or reason which way to turn a handle when they grab a fire extinguisher and this improvement is the last word in making a fire extinguisher practical.

The Fyr-Fyter Company of Dayton, Ohio, cordially invites inquiries regarding Fyr-Fyter.

SAFETY FIRST SUPPLY COMPANY IN NEW QUARTERS

Coincident with the progress of the "Safety First" movement and the increase in demand for safety devices and first aid equipment has arisen the necessity for the Safety First Supply Company to seek larger quarters.

This company is now located in a seven-story building at 107 Third Avenue, Pittsburgh, where the entire building is given over to the manufacture and distribution of appliances for safety first aid and welfare. It cordially invites visitors to inspect its display room and factory.

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SAFETY ENGINEERING

Vol. 38 AUGUST, 1919 No. 2

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Improving Shop Efficiency by Better Lighting

Good Electric Lighting Speeds Up Production, Reduces Spoilage, Prevents Accidents and Conserves Man Power

By Thomas F. Chantler

The Society for Electrical Development, Inc.

WITHOUT sight, manufacturing would be impossible. Without light man's efforts at manufacturing would be worthless. And with only a "dim, religious light" to guide his efforts man's manufactured product proves to be almost as much of a liability as an asset.

These are things so obvious that no manufacturer would care to confess that he had not known them always. Nevertheless, it required the repeated urgings of our Allies in the war for more and yet more speed in furnishing supplies to arouse employers generally to a recognition of the criminal extravagance of poor lighting in shop, factory, mill, mine and shipyard.

Four States, Wisconsin, New Jersey, Pennsylvania and New York, already have lighting codes supported by the legislation necessary for their enforcement. And from the art of aiding man's efforts by truly good illumination a definite science of lighting is rapidly being evolved. Also insurance companies writing workmen's compensation policies are advocating good lighting as a safeguard against accidents. Scientific bodies are pointing out the injuries to the eyes and health of the worker traceable to poor lighting. Finally, it is being shown by facts and figures deduced from actual tests that good lighting actually does serve to speed up production, reduce spoilage, prevent accidents and conserve man power in manufacturing and industrial lines.

Few men if any are in a better position to recognize the requirements of American manufacturing as a whole than the Hon. William C. Redfield, Secretary of Commerce, and he has been quoted as saying:

"I confess it seems to me somewhat surprising in this day that anyone should doubt the necessity of proper industrial lighting. Lighting of the very best kind has a double value in industry. It has, in the first place, a direct bearing upon the quality and quantity of output; and it has, secondly, quite as important, perhaps more so to the community, a direct effect upon the man who does the work. If he must work under eye-strain, he not only cannot do as good work and can only do less work than otherwise he would, but he does it with direct injury to his own future working capacity. From a human standpoint, therefore, it is a social wrong not to provide ample light. From an industrial standpoint, the investment in light is one of the most sensible a manufacturer can make."

And when it comes to expressing the sentiments of labor itself regarding the workers' need for adequate lighting what could be more illuminating than this utterance by the venerable Samuel Gompers:

"Good factory lighting has proved a sure means of forestalling accidents to workmen,

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and I am glad that American industry is waking up to this fact."

But in addition there are what might be termed dollars-and-cents reasons why the manufacturer should do everything possible to supply his workers with the best illumination available. Good lighting has been definitely shown to contribute to the prevention of accidents and the consequent reduction in insurance company rates for workmen's insurance. President Butler of the Travelers Insurance Company says:

"Insufficient or improper illumination is a direct or contributory cause of many accidents in workshops. This is a proven fact which is recognized by the Travelers Insurance Company in its rating schedules under workmen's compensation practice."

Again, and referring to New Jersey, one of the States boasting a Lighting Code, Lewis D. Bryant, Commissioner of the Department of Labor, has been quoted as saying:

"If a workman is injured and poor light is the cause, he will surely receive compensation. On the other hand, if a workman ruins his eyes by constant work under poor light so that he is incapacitated for further work, it will be difficult for him to obtain fair compensation. He is disabled because of his occupation just as surely as if he had lost an arm or leg at his daily task. It is the duty of every employer to provide good light as a guard against accidents and eye trouble."

By way of substantiating the foregoing opinions regarding the need for better lighting it is pertinent to refer to the statements of R. E. Simpson of the Travelers Insurance Company in a paper presented before the Illuminating Engineering Society on October 10, 1918:

"A survey of 91,000 accidents from the records of the Travelers Insurance Company for the year 1910 showed that 23.8 per cent. were due to improper or inadequate illumination."

The same authority explains that it is hardly possible that this percentage prevails at present due to the progress in illumination, but he goes on to say:

"There is some foundation, however, for assuming that 18 per cent. of our industrial accidents are due to defects in the lighting installation. On that basis the services of 108,000 men for one year are lost annually, because the illumination provided is not adequate for the safety of the workman."

What constitutes good lighting? That, doubtless, is the question uppermost in the mind of the reader who has grasped the significance of the opinions and the figures given. And doubtless one's unaided answer to that question would be, "Light without stint," But the sun's light is without stint, so to speak; and we all know of the many instances when it is too intense and too abundant, is a definite source of pain and injury to the eye. So a more nearly correct definition would be: An equivalent of diffused daylight, both in intensity and color of lighting. But we still fall short of the mark. Daylight is of many degrees and varieties, some of which occasion almost as much eye-discomfort as direct sunlight.

Now it is generally conceded that the ideal lighting occurs on a cloudy day when light from the sun must pass through a screen of vapor and clouds before reaching us. So it would seem that Nature, herself, is at her best when supplying a *semi-indirect* form of lighting.

When, as on a clear day, the sun's rays fall directly upon us Nature might be said to be supplying a *direct* form of lighting. And when man and Nature combine to have the direct rays from the sun reflected from outside a building through windows against which actual rays do not strike, an *indirect* system of lighting is obtained.

The lighting codes of New York, New Jersey, Pennsylvania and Wisconsin all vary somewhat, one from the other; and other States as they come to adopt codes may make certain conditions peculiar to their own interpretation of the requirements. However, the general requirements of good lighting may be given simply and briefly.

REQUIREMENTS OF GOOD ILLUMINATION

1. There must be on all working surfaces, whether in horizontal, vertical or oblique planes, a steady light of sufficient intensity for all working requirements.

2. A light on areas and walls adjacent to the working area comparable in intensity to the light on the working

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Machine Shop, Edison Lamp Works, Harrison, N. J. Localized General Illumination, 100 Watt Mazda Lamps

areas. (Note: When a lighted area is too sharply in contrast with darker surrounding areas the worker's eyes are taxed unduly every time he has occasion to look away from the lighted area, the eyes being required to focus violently in accommodating themselves to the transition.)

3. The light must be of a color and specular character suited to the purposes for which it is employed. (Note: An object is seen by the light it reflects, rather than by the light falling upon it. A white or light-colored surface reflects more light than a dark one. But all classes of work do not require the same intensity of lighting. Again, red and yellow light rays have greater penetrating power than blue rays, and that fact must be observed in lighting places like foundries having heavy cloudy atmosphere. But, on the other hand, the moulder requires less light than the tool maker. The actual lighting requirements according to the character of the work, may range from ½ to 15 foot candles.)

4. There must be freedom from glare and from glaring reflections. (Note: The meaning of glare can be suggested easier than it can be defined. According to the dictionary one is experiencing what is meant by "glare," as used in the terminology of lighting, when such conditions as these are to be noted: (1) To shine with fierce intensity, (2) to be unpleasantly brilliant or gaudy, (3) emitting an excessively brilliant light, (4) having a glossy, smooth surface, (5) a dazzling light. However, those definitions are not wholly above criticism. For example, the automobile headlight which dazzles and at night may truthfully be said to "shine with fierce intensity, to be unpleasantly brilliant and to constitute a dazzling light." But when that same automobile headlight is viewed against a background of daylight it is not to be recognized by any such definitions. Also, there are conditions under which glare is present in sufficient degree to work injury to the eye without the mind being acutely conscious of its

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effect. Someone, too, has said that just as dirt is matter out of place glare is light out of place.)

6. The lighting equipment should comprise a system which is reliable, simple, easy of maintenance and reasonable in initial and operating cost.

Now the spirit and letter of those six stipulations are easily within the financial reach of all employers ol labor, and the rewards to those providing truly good lighting are certain.

THE ECONOMIC ADVANTAGES OF GOOD LIGHTING

The Lighting Committee of the Commonwealth Edison Company of Chicago recently conducted tests to secure figures which would establish the value of good lighting in definite terms. Four of those tests have become, temporarily at least, classics in the annals of progress in illumination.

TESTS IN IRON PULLEY FINISHING SHOP

This shop finishes iron pulleys, both large and small, and is some 40 by 80 ft. in extent, giving an area of 3,200 square feet. As found, the illumination was largely by 60-watt lamps on drop cords, a few only being fitted with miscellaneous tin shades of the cheapest varieties. The consumption of electricity amounted to 0.27 watt per sq. foot; and the illumination therefrom averaged about 0.2 foot candle. But this light, of course, varied tremendously in intensity; one operator having something like 22 ft. cdl., while others groped about in a "spooner's" light of about 0.07 ft. cdl. The daylight effect, except on one or two machines was negligible, the windows being few and dirty.

The installation the lighting committee installed consisted of 200 watt, reflector-equipped units mounted some 10 ft. above the floor. The electrical consumption was increased almost 7 times, and the average illumination approximately 25 times.

The testing engineer's own records showed an average increase in production of 20 per cent. The proprietor also kept a set of records; and according to his figures the increase in production amounted to 35 per cent.

The cost of the improvement, with due allowance for depreciation, upkeep, etc., added 5½ per cent to the monthly payroll. In other words, from 20 to 35 per cent increased production at a cost of 5½ per cent of the payroll.

TEST IN A SOFT-METAL-BEARING MACHINE SHOP

This shop measures 48 by 50 feet. Practically the only change found necessary had to do with increasing the size of the lamps, the equipment and layout of the lighting system being declared satisfactory.

In this shop, to begin with, 25 deep-bowl reflectors were equipped with 100-watt lamps giving an illumination of 4.6 ft. cdl., the consumption of current being about 1 watt per square foot. The shop was run with this equipment, for one month, the management's regular records proving quite sufficient to show output accurately.

At the end of one month, the 100-watt lamps were replaced by 200-watt gas-filled lamps, raising the consumption of current to 2 watts per sq. ft. But because of the greater efficiency of the lamps the illumination was raised to nearly 13 ft. cdl.

It was the intention to revert to the original lighting intensity for the third month, and then back to the increased intensity for the fourth month. But after the second month's experience, using the daylight level of improved lighting, the management flatly refused to go back to the original equipment of 100 watt lamps. They held that the increase in their production as made possible by the improved lighting was vastly more important than the testing engineer's desire to secure entirely unbiased data.

The increased efficiency and production was determined by a study of eight operations. The increase ranged from 8 to 27 per cent, the average increase being 15 per cent.

The high percentage of increase secured through improved lighting is of particular significance in this instance, because the original equipment of 100 watt lamps supplied a measure of illumination held to be at least 20 per

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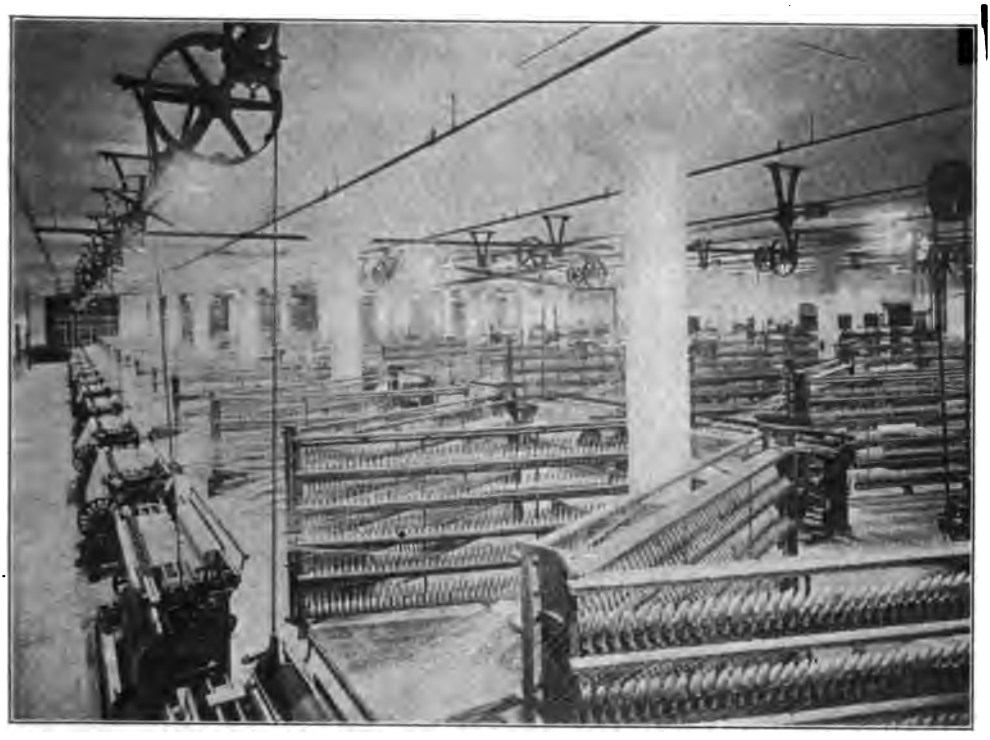

Botany Worsted Mills, Passaic, N. J. Warping Department. 48-400 Watt Clear Mazda "C" Lamps, Ivanhoe Metal Reflector

cent superior to that of industrial lighting generally.

TEST IN MACHINE SHOP HANDLING HEAVY STEEL PARTS USED IN TRUCK

This shop measured 40 by 58 ft. The same number of lighting units, reflectors and accessories were used for the improved lighting as had been employed originally. The only change was from 100 watt gas-filled lamps requiring a consumption of 0.6 watt per sq. ft. and having a lighting intensity of 3 ft. cdl. to 300 watt lamps consuming 1.7 watt per sq. ft. and giving nearly 12 ft. cdl.

The improved lighting resulted in an increase of from 6 to 14 per cent in three operations, the cost of productive intensity being 1½ per cent of the payroll.

TEST IN CARBURETER-ASSEMBLING SHOP

This shop measured 50x80 feet. In the work of assembling carbureters the operators handle rather small parts and make delicate adjustments. The management fully appreciating the importance of good lighting had installed equipment well above the average even before the test was made.

The old equipment comprised 100 Mazda lamps, principally of the 40 watt size giving an average illumination of a trifle over 2 ft. cdl. For the productive intensity runs, the 100 units were replaced by 29, nearly doubling the consumption of current, but increasing the intensity nearly six times.

This test was made just after the signing of the armistice, but despite the previous efforts of the management to speed production and the uncertainty regarding the need for continuing to speed production occasioned by the cessation of hostilities, the productive intensity of the shop was increased 12 per cent. Because the number of workmen was large and the rate of wage high, the increased production was secured at a cost of only 0.9 per cent addition to the payroll.

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THE CANDLE AS A UNIT OF MEASURE

Doubtless all are familiar with the term "candle power," but probably few aside from those having made a study of lighting are precisely informed as to the exact significance of that term. Nevertheless, the explanation is within the understanding of even the school boy and may be given in a few words.

When new light sources began to take the place of the candle it was but natural that their superior illuminating power should be expressed in terms of the candle familiar to all. Doubtless early comparisons were made by setting up the candle and the lamp in the line of vision and gauging them by means of the eye, the most natural direction in which to look at the illuminants being the horizontal. The strength of the new illuminants were rated as being the equivalent of so many candles. Thus when we say today that a lamp is of 10 candle power we really mean that its lighting intensity or strength in a horizontal direction is equal to that of a group of 10 standard candles. The one essential to remember in this connection is that the stated candle power of a lamp represents the intensity in one direction only, it does not indicate the total quantity of light emitted by that source.

The mean spherical candle-power of a lamp means simply the average of all the candle powers in all directions about that lamp. That is to say, a source giving 1 candle-power of light in every direction would have a mean spherical candle power of 1. Or if the intensity of light in different directions varied but the average of all was the equivalent of 1 candle in intensity, then this source, too, would have a mean spherical power of 1.

The foot-candle is the unit of measurement most intimately associated with the popular understanding of lighting. A foot-candle represents an intensity of illumination equal to that produced at a point on a plane which is 1 foot distant from a source of 1 candle and which is perpendicular to the light rays at that point.

A crude idea of the foot-candle of illumination can be obtained by considering the intensity on a newspaper being read by the light of 1 candle, the paper being held 1 foot away from the candle. Two candles would give 2 foot candles of light under similar conditions; 3 candles would give 3, and so on.

The lumen is the unit for measuring the quantity of total flux of light emitted by a source. This can be explained by imagining a sphere measuring 2 feet in diameter on the inside and painted black, so that light falling upon the inside surface of the sphere from a candle placed exactly at the centre will be absorbed and none of it reflected. Now if an opening measuring one square foot be cut in the sphere the amount of light that escapes is considered to be the unit of quantity, and is called a *lumen*. If 2 candles are used then 2 lumens of light will be emitted, and so on. By geometry it is known that the total surface of a sphere having a diameter of 2 feet is 12.57 square feet. Thus if the mean spherical candle power of a lamp is known we have only to multiply this value by 12.57 in order to obtain the number of lumens emitted by that lamp.

THE RELATION BETWEEN FOOT-CANDLE AND LUMEN

By the foregoing operations it is shown that the intensity of light falling upon 1 square foot of the inside surface of a sphere 2 feet in diameter and having a candle placed directly at its center is 1 foot candle. We also know that the quantity of light direct from the candle which falls upon 1 square foot, of the surface of that sphere is 1 lumen. This gives us the important law that when 1 lumen is so utilized that its total light is spread over a 1 foot square surface, that surface is lighted to an average intensity of 1 foot candle. Through this relation the designing of a lighting installation is greatly simplified. Because once the number of square feet to be lighted and the required intensity of illumination are known, it is easy to determine how many lumens must fall on the working

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plane. To illustrate, should it be necesary to illuminate a working surface of 100 sq. feet to an intensity of 5 foot candles, 500 lumens must be utilized.

FACTS THE MAN INTERESTED IN BETTER LIGHTING SHOULD KNOW

The methods of artificial lighting have been mentioned previously in connection with Nature's way, but it will not be amiss to point out that lighting, to begin with, is either local or general. Sometimes, too, both systems are combined. The form of light-distributing may be either (1) indirect, (2) semi-indirect, (3) direct.

Indirect lighting screens source of light and allows only reflected light to reach the working plane.

Semi-indirect lighting screens source of light but allows a certain amount of light to diffuse through shade.

Direct lighting requires that a shade or reflector be placed around the light so that direct and reflected light are thrown on the working plane.

DIFFUSION OF LIGHT IS ESSENTIAL

Adequate diffusion is held to be absolutely essential to good lighting. That is to say, the light at any one point should come from a number of different directions so that shadows are soft and transparent. Also, the lighting must be in sufficiently large areas to occasion only soft shadows and at the same time be small enough in area to afford ample direct light. As a general rule, too, light walls and ceilings add to the general efficiency of the lighting, and save eye-strain by minimizing contrasts between working light and that which lies about it.

DAYLIGHT OF WINTER SELDOM IS ADEQUATE FOR INSIDE WORK

The outside light on a bright summer day has been estimated to equal the equivalent in intensity of 5000 ft. candles. Work is generally possible inside a building with a day light factor of 1/10 of 1 per cent or 5 foot candles. But British tests have shown that on the average December day the outside daylight does not exceed 750 ft. candles even at noon. Hence on the basis of 1/10 of 1 per cent the inside factor will be less than 0.75 ft. candles during practically all daylight hours during the winter. It is estimated by the way, that the proportion of outside light which reaches the inside of a building through windows seldom reaches 10 per cent, and very frequently is as low as 1/10 of 1 per cent at various points.

LIGHT REQUIRED SHOULD BE DETERMINED BY COMPETENT AUTHORITY

1000 ft. candles doubtless would be insufficient illumination for threading a needle if the needle be held against a steel gray background. But if the needle be held against a white background, ½ ft. candle light is ample. The man best equipped to determine the details of the lighting equipment is of course the man best informed regarding the available lighting expedients and requirements—the illuminating engineer, that is to say.

Increasing Demand for Scientific Lighting

An interesting index to the growing importance of the industrial field to the electric lighting industry is revealed by statistics prepared by one lamp manufacturer showing that in a twelve-month period, covering portions of 1915 *and* 1916, *the sales to central stations amounted to* 34 *per cent of the total, while the sales to industrial plants amounted to* 28 *per cent.*

With the rapid growth of the large unit, high efficiency, electric incandescent light, the figures were greatly changed for the corresponding periods in the years 1918 *and* 1919. *Sales to central stations had fallen to* 20 *per cent, the industrial sales had risen to* 41 *per cent, and the total volume of sales had multiplied threefold. This great growth in the use of incandescent lamps in industrial plants is coincident with the passing of the arc lamp for that service.*

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Factory Lighting for Safety and Production

Earl A. Anderson

Engineering Department, National Lamp Works of General Electric Co.

THE safety feature of good industrial lighting has long been known but only recently has received the attention from industrial men which has always been due it. Fortunately, improved lighting has commercial, as well as humanitarian, value so that rapid advances in this direction are to be expected.

Progress in the art of light production and application has been such that the new demands for illumination of the requisite intensity, adequately controlled as regards direction, diffusion, and other desirable qualities can be fully met. With modern lamps and accessories it is practicable and economical to furnish light of an intensity comparable with average daylight conditions in a factory and equal in quality, so that no harmful results can ensue and production can be kept at a maximum.

IMPORTANT CONSIDERATIONS

Two very important considerations in the design of a satisfactory lighting installation for industrial plants are: a supply of light of sufficiently high intensity on all working surfaces; and, the choice of reflecting equipment such as will avoid the harmful effects of glare and of glaring reflections, as well as dense shadows or sharp contrasts in intensity in any part of the room.

Careful study and observation on the part of illuminating engineers and men concerned with safety considerations among employes have established the fact that there are lower limits to the intensities for the different classes of work in industrial occupations. These quantities must be supplied to permit comfortable vision, conserve eyesight and eliminate accident hazard. The industrial commissions of various States are now taking cognizance of this fact and are beginning to require the employer to provide at least these minimum intensities. Experience and tests in modern factories have shown that much higher intensities than are required for the protection of the workmen lead to more economical production through a decrease in the amount of spoilage and because of the greater alertness and better morale of employes working in brightly lighted surroundings.

THE FOOT-CANDLE METER

The development of a new device by which the values of intensity can be easily determined by anyone has led to increased interest in lighting intensities on the part of industrial managers. This instrument, the Foot-Candle Meter, Fig. 1, will indicate directly on the scale the intensity of illumination in foot-candles* at any point in a room. It is no longer necessary for any employer to refer to calculations and formulae to determine the intensity of light in the various parts of his establishment. Now, he can determine from a table what intensity is advisable for each kind of work and then easily check with the foot-candle meter the actual intensity which is being provided for that work and immediately know whether or not the illumination supplied is adequate. It is evident, then, that the foot-candle meter has added new usefulness to the tables of intensities which have been agreed upon by competent authorities as the minimum intensities under which work can be carried on without

*The foot-candle is the unit of intensity and is equal to the intensity at a point on a plane at right angles to, and 1 foot from, a source of 1 candle.

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Fig. 1—Foot-Candle Meter

Fig. 3—Opal Glass Diffusing Cap

Fig. 2—RLM Standard Dome

Fig. 4—Metal Cap Diffuser Unit

risk of eye-strain or accident to the workman.

Following is a representative table of acceptable intensities for the various kinds of industrial occupations, broadly classified:

PRESENT STANDARDS OF INTENSITY INDUSTRIAL*

	Foot-Candles
For intermediate and auxiliary spaces in interiors: aisles, passageways, stairways, etc.	½— 2
For handling coarse material and work involving no discrimination of detail..	1— 3
For rough manufacturing operations, such as: rough assembling, rough forging, rough woodworking, rough bench work, ice-making, etc.	2— 6
For medium manufacturing operations, such as: medium machine work, medium assembling, automatic machine work, meat packing, tobacco manufacturing, laundries, etc.	3— 9
For fine manufacturing operations, such as: fine assembling, fine pattern making, fine machining on metals, knitting, office work, etc.	4—12
For extra fine manufacturing operations, such as: watch and jewelry making, engraving, typesetting, machine stitching on shoes, cutting and sewing dark garments, etc.	8—

*It must be remembered that, other things being equal, work on dark goods requires a higher illumination than work on light goods.

LIGHT SOURCES TOO HIGH IN BRILLIANCY

The mistake of using light sources too high in brilliancy should be guarded against when efforts are directed to providing a high intensity. Especially when using larger lamps

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Fig. 5—One-Piece Semi-Enclosing Unit

care must be exercised to mount the units well above the range of vision and use suitable diffusing accessories in order to guard against glare.

The choice of the proper reflecting equipment is a matter which often requires careful study of the condition of the surroundings and of the nature of the work to be done. It is impossible in an article of this kind to discuss all of the good types of reflectors; it has been the aim of the author, therefore, to describe briefly the characteristics of some typical units which will find successful application in a majority of the industrial lighting installations.

DOME TYPE METAL REFLECTOR

For general illumination in industrial plants there is available a specially designed dome-type metal reflector known as the RLM (Reflector and Lamp Manufacturer's) Standard

Fig. 6—Dense Opal Semi-Indirect Unit

dome, Fig. 2. This unit is the result of careful and thorough study of general industrial lighting requirements by the more prominent manufacturers of metal reflectors in conjunction with the illuminating engineers of the Mazda lamp manufacturers. Such

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factors as the angle of cut-off, the minimum diameter of reflector for each size of lamp, the light distribution and the reflection constant for the surface are specified in reflectors of the RLM standard design.

In general, clear bulb Mazda C lamps should not be used with dome reflectors at mounting heights of less than 20 feet. At this height the nearest lamp within the usual field of vision is so far removed that ordinarily the amount of light entering the eye directly from it is insufficient to cause glare; also the lighting unit subtends so small an angle at the working surface that shadows are not greatly softened by frosting the lamp. When suspended nearer the floor the lamps should be bowl-frosted or otherwise rendered diffusing. So far as direct glare from the units themselves is concerned, bowl-frosting the lamps would usually prove sufficient. However, in some cases the resulting brightness of images of the unit in polished surfaces at the work may be found excessive, and shadows remain so sharp as to be annoying, inasmuch as nearly one-half of the light received at the work comes directly from a small portion of the frosted area. Where the most exacting visual requirements exist, such as medium to fine machine work requiring close and steady application, it is well to fit the lamps with the dense opal diffusing cap shown in Fig. 3. When this is done, glare, both from the lamp itself and from specular images, will be almost entirely eliminated. Most of the light will come from the large surface of the reflector, and therefore shadows will be made soft and luminous with gradually fading edges. The work of maintenance is somewhat increased when these glass caps are employed, inasmuch as a small amount of dust will enter the narrow space sometimes left between the cap and the lamp bulb. The glass itself, however, is smooth and readily cleaned.

LIGHT THAT "SHINES AROUND"

Where fine detail is to be observed and close application is required, softened shadows and the maximum freedom from reflected glare are necessary to conserve vision and increase output. In a direct lighting system this is accomplished by redirecting all of the light from a surface of large area, so that the brightness of every part of the source may be low and that the light may "shine around" objects.

An illustration of a type of unit of this kind which finds its greatest use in high grade machine tool rooms or where very fine work is done on polished surfaces is the metal-cap diffuser shown in Fig. 4. A polished silver cap fits closely over the tip end of the lamp and reflects the intercepted light against the porcelain-enameled surface, whence it is thoroughly diffused and directed to the work. A reflector of special design and large diameter is required to give most effective results with the silvered reflecting cap. In order to secure a wide distribution of light over the upper reflector, it is necesary that the opaque cap have a specularly reflecting surface, and that the unit may be efficient this surface should be of silver. The metal cap is held tightly against the lamp bulb by a spring holder and the edge is so designed that no space is left through which dust might enter. Furthermore, no air circulates over the silvered reflecting surface and it therefore retains its efficiency during the life of a lamp and need be repolished only when being installed with a new lamp. When a plant is lighted with these units, the results may be made equal to the best daylight conditions secured in the most modern factories.

GLASS AND METAL REFLECTORS

Considerations of reflector and lamp breakage with possible injury to materials and workmen, as well as the cost of replacements, have led to a smaller demand for glass than for metal reflectors in industrial plants. There are, however, many manufacturing conditions under which these considerations are of minor effect and where glass units of the proper type may be applied with advantage. For offices, hallways and drafting rooms, where the ceiling has a low reflecting value, some form

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of semi-enclosing glass unit will be found to present a pleasing appearance and to give very satisfactory illumination.

Such units consist of a diffusing glass bowl suspended beneath the lamp, above which is placed either an opaque reflector or one of dense opal glass. This upper reflecting surface is made large in order to produce added diffusion. The space between the lower bowl and the upper reflector is sometimes left open, or it may be enclosed with clear glass. Again, the unit may be in one piece with a coating of enamel placed on the outside of the upper reflector and the lower bowl, as in Fig. 5. To be most satisfactory, fixtures of this type should have a bowl of considerable size and density so that the brightness may not be excessive. Those units with the greatest number of vital surfaces exposed to dust accumulation will, of course, show the most rapid depreciation in service. If, as in the case of the fixture shown in the figure, dust accumulation can be confined practically to the upper surface, loss from this cause will be small.

For drafting rooms with white ceilings the semi-indirect or indirect system, in which the ceiling is used as the upper reflector and illumination received from a larger surface than with any of the equipment previously discussed, will be found best suited to the requirements. When a sufficient number of semi-indirect units, such as shown in Fig. 6, are installed the requirements for a drafting room, viz., high intensity and no shadows, will be met.

"NO DENSE BLACK SHADOWS"

In conclusion, it may be said that for satisfactory general illumination in industrial plants the equipment should be chosen so that there will be no dense, black shadows and none so sharply defined as to cause confusion between machine parts and their shadows. Soft, luminous shadows, which are present when the source is large in area, are, in most cases, desirable. The visible sources must be low in brilliancy to minimize glare and specular reflection. The number and size of lamps installed should provide not only a sufficiently high intensity for the conservation of eyesight and the prevention of accident, but ample light for efficient production.

Hazards in the Common Portable Extension

By Chester C. Rausch

Assistant Director, Safety Institute of America

A MAN once lost in the woods on a dark night gauged the darkness well when he described it as being as "black as the inside of a cow." While his anxiety at being lost may have lent a sense of additional darkness, his feelings can be easily appreciated by those men who are so frequently required to work in out-of-the-way places where daylight seldom, if ever, reaches, and where artificial light is so infrequently needed that it is taken there only when emergency suddenly requires light or while work on repairs is taking place. Such occasions are almost without number and occur quite as frequently in the regular work of maintenance and repair in a factory as during those infrequent inspections done outside of the regular hours.

THREE SOURCES OF LIGHT USED

Contractors' men who work on new construction where permanent fixtures are not installed, or men called upon to

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do unusual repair work in plants not fitted to do such work, are apt to find their work must be done in almost utter darkness or far from any adequate permanent sources of light. Many regular operations also require the constant use of portable extensions. In all these instances there are three sources of light commonly used—the candle, the kerosene lantern, and the electric light fitted up as a portable extension.*

The candle presents only fire hazards. Set upon inflammable material and forgotten, it burns down and causes fire or it may, unless mounted securely on a small base, be accidentally tipped over into spaces between partitions or into loose inflammable stuff and so cause fire. In very confined spaces it may even be placed in such a way as to burn material above or inside it, and in the presence of inflammable gases or liquids cause explosion and fire. The candle has, however, one very decided advantage when used in such spaces; it quickly indicates air that has become, or is becoming, irrespirable, an especially valuable feature for workmen using dangerous substances in spaces having little or no ventilation.

The ordinary tubular or cold blast lantern burning kerosene is familiar in all parts of the country. It is remarkably safe and gives good light when clean, and if the globe or chimney is properly protected against breakage by an open wire guard, it will stand an unbelievable amount of abuse without causing fire or going out. The cold-blast arrangement prevents overheating, thus eliminating practically all danger of fire except when the oil chamber or burner gets broken or unless it is left burning with the wick turned very high so that the flame smokes. In a surprisingly large number of cases, the flame is extinguished by the jar, or by the inrush of air when the chimney is broken and the lantern is roughly handled. The bulk of the lantern prevents the heat from the flame igniting material near it, and only when very light, dry and inflammable stuff comes into actual contact is there much danger of fire. There is almost no danger of getting burned when using these lanterns.

*The use of the word "extension" in this article is intended to mean an electric light, protected by a cage and connected to electric supply by a flexible cable. (See Fire Underwriters Standards for such equipment.)

THE PORTABLE EXTENSION

The electric portable extension, however, is a cat of another color. It has, besides a fire hazard, the danger of electric shock, potential death unless recognized and properly guarded against.

Fire from extensions is caused by several kinds of defects in the apparatus or from its misuse. The bulb may be broken unless guarded by a stout wire cage, thus permitting the wire stubs of the leading-in wires to become short circuited in inflammable material, and cause fire. The bulb, unless caged, may hang so as to heat and ignite any inflammable material nearby, and the placing of newspapers or clothing or even shingles over bulbs to shield the light from workmen's eyes has caused fire, even when there appeared to be ample ventilation to keep material below an igniting temperature.

The use of light-weight lamp cord or old wire on which insulation has become brittle, permits even slight wear to break through the insulation. Unnecessary hauling about of even new and well insulated cord will cause the same thing. The use of long runs of wire, hanging unsupported, causes the copper to stretch, and may so reduce the cross section that the current carrying capacity becomes so low that heating, and even sudden melting with a tendency to flash takes place at the reduced cross-section. Single wires used for cord show this tendency to neck-out, even more than stranded cables or cord.

Many times bad kinks localize strains that break both insulation and wire when an attempt is made to pull them straight by sudden jerking. Whenever a cord has been coiled it should be uncoiled by unrolling and not by paying out so that the cord lies like a corkscrew in coils on the floor. In this form it kinks readily, snarls with rubbish and tools, catches on staging and trips workmen. The habit of hanging long lengths of cord from nails may cut or crimp the insulation, thus causing short circuiting inside the cable, or over the nail.

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SUBJECT TO SEVERE WEAR

Extension cord is subject to severe wear from being dragged over the ground and floors in grit, over and along sharp edges and from exposure to water, heat, oil and chemicals. It is not only uncommon to see bare spots on wire where insulation has been worn off, but also to see small pieces of wire from stranded cable piercing the insulation in such a manner that they may cause shock to persons handling the cord, or so charge other equipment that shock may occur by contact with it at points remote from its contact with the cord.

Frequently, in an emergency, very light weight cords of small current carrying capacity are picked up at random and used to supply small boring and reaming tools, fans, drills and even several large lamps. The cord, thus badly overloaded, heats so that the insulation is ruined and it may cause fire or shock when handled.

Many times the bare lamp permits light from extensions to shine directly into the eyes. This results not only in poor work but so blinds the workman, that the moment he steps from this brilliant light he frequently fails to see clearly and so falls or stumbles.

One has but to mention the fact that 110 volts—the ordinary lighting and small electric fan and tool voltage—is frequently fatal, to start a small riot of argument. The fact remains, however, that accident records show nearly as many deaths from this voltage as from higher voltages. The only essential for a fatality is good contact with the two wires of a circuit or a source of current and with the ground. A small point of bare wire, a grounded socket or a lamp guard gripped by the hand of a workman while in contact with the steel frame of a building or with steam, gas, water, or sprinkler pipes or with his feet in a puddle of water is often sufficient to establish a current through the body.

TYPICAL INSTANCES

The following typical instances, among many known to the writer, illustrate such conditions. Two men were rodding connections between tan vats. One man, while wearing rubber boots and standing in tan liquor, reached up to take a lamp enclosed by a light wire shield handed to him by his helper. The lamp had been accidentally dropped into the tan liquor so that the liquor formed an electrical connection between the metal base of the lamp and the metal socket into which it was screwed. The guard, the man's hand, his body, his perspiration soaked feet, the damp and loaded rubber soles of his rubber boots and the tan liquor found a good connection to the earth. Even though the rubber boots were afterward found to be waterproof they did not form insulation. Death resulted to a normally healthy man with a strong heart.

A couple of men were in an old acid storage tank drilling for a patch. It was a humid day so a small portable fan was rigged inside the tank to cool them. The cable leading to the fan was new, but the men carelessly dragged it over the ragged edge of the manhole of the tank, cutting the insulation. The wire lay in a small puddle of water left after the tank had been washed out. Later, one of the men gathered up the slack cable and the fan in one hand, coming into contact with the wet cable at the bare spot. With the other hand he touched the side of the tank to steady himself as he moved about. He was 22, strong and well, and had been accepted for the draft. He died from electric shock.

An invalid was obliged to lie in a bath of hot water for hours each day. He rigged a portable extension that he might have light by which to read. One day while sitting in the water he attempted to move the extension, but the cord, overstrained by his pulling, became loose in the socket. The invalid felt a decided shock. The fact that he was in a porcelain tub of practically clean, fresh water, insulated him. Had his feet been in contact with the metal drain, or had the water been salt, he probably would have been severely shocked if not killed. Clean fresh water is a poor conductor of electric current, but dirty or salt water an excellent one.

A cornice maker was working on a roof. To finish a rush job he worked after dark, using an electric soldering iron and a lamp from the same extension

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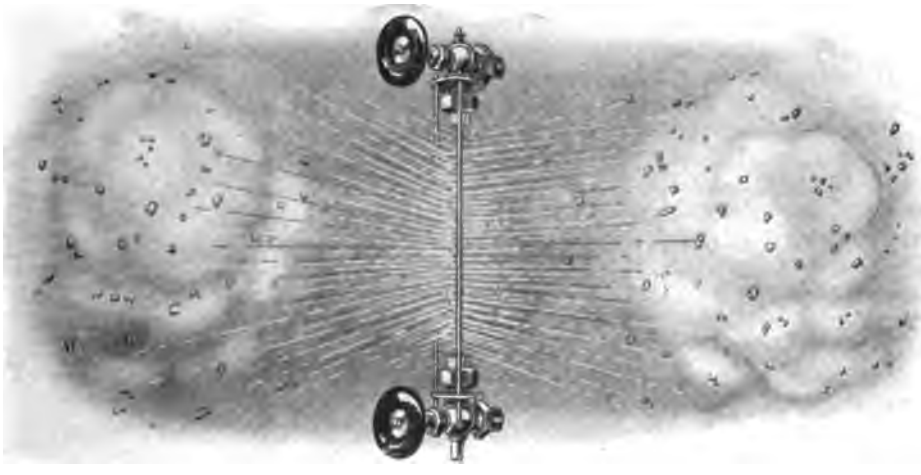
cord. The junction where the cord to the lamp and iron separated was twisted and taped. While being used the tape came off and the wire was left bare at that point. In hauling it about while working, it caught under the man's knee. Current passed through his knee, legs, body and the hand by which he held the solder to the cornice, thence through the steel to the ground. He was found dead, badly burned as he fell unconscious upon the metal cornice.

NOT DUE TO WEAK HEART

The argument that death was due to a weak heart could not hold in any of the above cases, for all of the men were young and vigorous. Few workmen have weak hearts, and in many cases where death has resulted from shock life might have been maintained had there been an immediate and continued application of artificial respiration. Hundreds of cases of minor shock from low voltage do not prove fatal because the connections to ground or the contacts are poor. One has no means ready to hand for determining when such connection may be good or bad, safe or fatal. The only safe measure is to use rugged equipment, care in handling the cable and in making connections, and to discard or repair equipment when its condition is at all questionable. For a man to work alone in isolated and confined spaces is bad enough, without subjecting him to extra hazard from using electrical equipment not maintained in the best condition. The pernicious habit of allowing a workman to keep an old and dangerous extension light in his tool box for his own use should be prohibited. At no place can the electrical department do more effective work than in the preparation and maintenance of an adequate number of substantial extension cords and lamps ready for any emergency, nor managers reduce the cost of making repairs or performing regular work, where this type of light is used, than by the provision of only the best material.

Here Is A Source of Eye Accidents



When the Boiler Gage Glass "Lets Go". These conditions suggest the need of a respirator as well as goggles. This happens every day and entirely without warning. "Throughout the length and breadth of the land gage glasses are breaking, on an average, at the rate of several per minute."

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Oil Fire at Bayonne, N. J.

THE Chief Inspector of the Bureau of Explosives, Colonel B. W. Dunn, urged, on July 1, the employes of railroads, "car inspectors, yard, train and engine crews," to prevent the heavy gasolene losses, saying: "Considering its characteristics and the volume of its movement, gasolene is the most destructive article now handled by the railroads. The loss and damage to life and property, due to the transportation of gasolene during 1918, exceeded many times the loss and damage due to the transportation of the unusually large volume of explosives required to meet war conditions."

On July 24, at 7.15 a. m., a carload of gasolene blew up at the plant of the Texas Company, Bayonne, N. J., startling the population of the city and threatening, for a time, the destruction of the entire plant. Eight cars of oil were destroyed and one building seriously damaged. Property loss about $150,000.

The Texas Company appealed for aid to the Standard Oil Company's nearby plant and two cars filled with Foamite solutions were sent. Foamite got to work and immediately controlled the fire.

Photo by International Film Service

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A New Development of the Gasolene Hazard

IT happened in Boston, Mass., on the afternoon of July 18, in this wise: A gasolene tank truck, containing nearly 1,000 gallons of gasolene, was bowling northward along Massachusetts avenue. At Belvidere street, near the intersection of Boylston street, it came into collision with an army truck.

Apparently, the army machine merely grazed the tank, at least the shock did not suffice to impress the tank driver that his machine had sustained any damage, but it was sufficient to break off the faucet through which the gasolene was withdrawn and permit the contents of the tank to flow upon the street. A passer-by notified the driver and the tank was driven into a partial ditch on Boyleston street, made by the relaying of the street car tracks, but the flow of gasolene could not be stopped. Most of it had, however, already escaped.

Then came the fire on the gasolene-covered street. Just how is uncertain; the newspapers, generally, suggested a cigarette butt or match thrown from a passing automobile, but the deadly incendiary qualities of "back-fire" operating near enough to the surface to be well within the line of vapor should not be forgotten. The chance that this was the true origin is much greater than the match or cigarette theory.

At any rate the whole street was ablaze at once, especially the gutters, the slight grade tending to spread the flames rapidly. The flow was arrested by a level-headed policeman who procured two barrels of ashes and erected a miniature dike that proved a successful barrier.

A thousand gallons of gasolene spread over so large an area would, of course, impose a severe hazard for a few moments, but the few moments were more than sufficient. Fifteen automobiles and trucks were burned in various degree, some severe personal injuries were suffered and some damage done in the way of cracked glass and blistered paint and some chipped curbing.

Of course the gasolene burned in this manner would not produce intense heat, but 15 simultaneously burning automobiles would, and the heat and flame of the gasolene was enough to ignite at once the motor vehicles.

Probably, in part at least, because of the torn-up pavement in Boylston street there were fewer automobiles than normally in the area involved, a good fortune not likely to be repeated should another such accident occur.

CONTROLLING THE BLAZE

The fire was controlled by first extinguishing it in the burning vehicles, and then washing what was left into the sewer by fire streams—a proceeding somewhat hazardous in itself had not the gasolene fire nearly exhausted its vigor by this time. So far as learned, no reservoirs on the automobiles exploded or were ruptured.

The protective remedy against a recurrence is not clear. Gasolene is a necessity, and consequently its transportation may not be prohibited, so the danger will persist, in some degree at least, but probably it can be palliated by more stringent rules and special precautions.

Carrying large amounts of highly conbustible material (it is more properly semi-explosive, since, although not explosive in itself, it generates highly explosive vapor when exposed) should only be permitted under conditions and with safeguards that would render future recurrences of this nature extremely improbable. In this case the property loss was not very large and there was no loss of life. Next time a veritable holocaust might be the result, or at any rate a calamity, and this should be a sufficient warning.

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Peace Perils From the Sky

THE sky is no longer a No Man's Land. It is soon to have a human population, navigating airships and airplanes for business or for pleasure. Gravity is still unsubdued and it may be relied upon to pull down to earth, with increasing frequency, objects big and little that will kill and maim men and women and destroy property. The first business building to suffer by an attack from the sky, in time of peace, is the Illinois Trust & Savings Bank building, Chicago.

On July 21, thirteen persons were killed in the offices of the bank, and a score or more injured, when a small dirigible, owned by the Goodrich Tire & Rubber Company, making a flight over the city, caught fire and dropped, crashing through the skylight of the building. The blimp carried five passengers, two or three of whom were instantly killed. Nine employes of the bank were either burned to death or crushed under the motors of the airship. The gasoline tanks exploded, wrecking the interior of the bank and setting fire to it. Blazing gasoline sprayed on the clothes of the trapped workers.

Photo by International Film Service

Blimp Falls Through Roof of Chicago Bank, Killing Thirteen Persons and Injuring a Score

It is a commentary upon the "Safety First" measures of the Chicago fire department that many of the bank employes owe their lives to the prompt response of the department to the general alarm which was sent in as soon as the accident occurred.

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Safety to Life in Retail Stores and Schools

A Tentative Consideration of the Possibility of Holocausts and of Practicable Ways to Prevent Them

Report of the Committee on Safety to Life, National Fire Protection Association

[The report of the committee, wholly tentative, was in two sections, one relating to Safety to Life in Retail Stores and the other to Safety to Life in Schools, the committee inviting criticism and constructive help. As a result of suggestions from the floor and other suggestions transmitted in writing at the request of the committee important changes are to be made, particularly in the section relating to Safety to Life in Schools.

The committee's estimate of floor space per person for customers and employes in retail stores and the allowance of 30 minutes for egress were questioned.

In the section relating to Schools, SAFETY ENGINEERING has incorporated in the original text changes suggested from the floor and immediately accepted by the committee. Others presented later in writing are to be considered by the committee.

See editorial note on page 81.]

THE data presented are based on a reasonable amount of specific information secured by the committee on large department stores in particular, on existing building regulations, and on the experience and judgment the committee has been able to develop in four years of study of the factory egress problem. The committee wishes it to be clearly understood that it may, in the light of additional data and further consideration, deem changes advisable both in the plan of procedure and in the values assigned.

THE IMPORTANCE OF THE PROBLEM

There are tens of thousands of retail stores throughout the land, ranging from the humblest 1-story shop, presenting little of an egress problem, to the mammoth department store which, under rush conditions, houses over 15,000 persons at one time.

Great heights, enormous areas, often without a single division in wall, open elevators, stairs, and even light wells, large quantities of highly inflammable goods, special hazards scattered throughout the structure, and a great number of undrilled persons combine to produce holocaust possibilities of serious proportions. The country fortunately has never suffered a department store holocaust. In spite of the acceptable record to date, your committee believes that retail stores, as well as factories, should be called upon to meet a reasonable standard of egress requirements.

DIFFERENCE BETWEEN THE STORE AND THE FACTORY PROBLEMS

The fundamental difference lies in the inability to control the number of persons who enter a retail store. In a factory the management, if it will, can meet the specific conditions laid down for a given building. In a retail store, however, the only limitations are the number of people that the building will hold with due regard to ability to move about and to be waited on, freedom from discomfort of very dense crowds, and, of course, the fact that under the worst conditions of crowding not all departments will be filled to maximum capacity.

The fact that the best drilled group of employes cannot be relied upon to handle a large panic-striken group of shoppers points to another fundamental difference between the retail store and the factory.

The ignorance of the customers as to the exit stairs and the difficulty of insuring a sufficient distribution of customers to make more or less uniform use of the available stairs is another disadvantage of the retail store situation.

The reliance of customers and clerks on elevators and the generally ample provision of elevators makes it necessary to recognize the passenger elevator as a form of egress in retail stores, something which has so far not been done in connection with the factory egress problem.

THE COMMITTEE PROPOSAL

As with factory buildings, the committee in devising a plan of establishing the

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number of occupants that may use retail store buildings has in mind the following fundamental principles:

1. To forbid the use of signally dangerous buildings for retail store purposes.

2. To encourage the improvement of existing buildings not up to a reasonable standard of safety.

3. To give due recognition to essential life safety factors such as superior construction, protection of vertical openings, provision of horizontal exits, moderate heights, and provision of automatic sprinklers.

4. To encourage the best possible construction and protection for new retail store buildings.

The plan also is, in so far as possible, to make use of the principles and values established in the factory building egress code approved by the association in 1918.

In due course the committee expects to put its conclusions and recommendations in specific form, and its credits for various features listed above into a tabulation such as the one which is a part of the factory egress code. The following sections discuss principles and propose some preliminary figures and values.

CONSTRUCTION, HEIGHTS, AREAS, AND VERTICAL OPENINGS

The committee presents a tabulation in which are set forth suggested limitations of the inter-related factors of construction, height, area, and vertical openings, with due regard to provision of or lack of sprinkler protection. This tabular data will be merged into the final tabulation by which the relative life safety of various buildings is established.

It is to be noted that the permissible story heights selected for existing buildings are never, except in one case, as liberal as the factory limits for moderate hazard occupancies, and that, except as regards open stair buildings and the case mentioned, the story heights are as low or lower than those for high hazard occupancies, in factory buildings.

For new buildings, the heights and areas are those appearing in the 1915 edition of the National Board Building Code, which limits seem reasonable to your committee except that with maximum protection it is believed that buildings as high as 12 stories should be permitted.

The areas permitted in existing buildings have been made generous where vertical openings are protected and sprinklers installed. This will tend to encourage the protection of vertical openings, as being easier and less expensive than the building of fire walls. It must not be forgotten, however, that these are minimum requirements, and that the calculation of egress facilities needed as finally made may show that a store to avoid putting in any additional stairs may find it wiser to add another fire wall because of the liberal credit proposed for horizontal exits.

AREA THE BASIS OF NUMBER OF OCCUPANTS

From such data as your committee now has available regarding certain important department stores, it looks as though in those portions of the stores where the greatest crowds are to be found the part of the total building area available to customers approximates one-third. A moment's reflection will indicate that to handle many people there must be much counter space and many clerks, and a consequent reduction in the floor space available to customers. In those departments where there are relatively few customers there frequently are very large open areas as in cloaks and suits and floor coverings' departments.

Assuming that in spaces available to customers each customer requires 10 square feet under maximum crowd conditions, there would then be approximately 30 square feet of total building area required per customer. Allowing one sales person for each four customers, a total of 24 square feet of floor space per occupant will follow.

The amount of stair and elevator capacity needed by a building must bear some relation to the time to get all people out of the structure, and it would obviously be unfair to require sufficient egress facilities to take care of all floors on the maximum occupancy basis which can probably be expected in basements, first stories, toy departments, restaurants, and possibly certain other sections. Your

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committee favors first-class egress from basements, obviously sufficient exits from first floor to take care of all people who may be in the building, and then sufficient stair and elevator capacity to take care of persons above the first floor with due regard both to the aggregate number of persons and the fact that on certain floors above the first serious crowding is to be expected. In other words, there must ultimately be established an allowance of square feet per person for floors above the first, and a figure not nearly as great as that for the first floor and basement.

THE "EMPTYING TIME" FACTOR

When the likely number of persons in a building has been established on an area basis, it becomes necessary to provide sufficient stair and elevator capacity to get these persons out of the building in a reasonable time. It is proposed to vary this time greatly as regards the retail store, as was done with factory buildings, with due regard to construction, height, protection of vertical openings, provision of horizontal exits, and provision of automatic sprinklers. It is proposed to use an average occupancy hazard, perhaps about equal to the "moderate hazard" class in our factory building egress code.

Your committee believes that it should be possible to empty the poorest types of stores in two to three minutes, and the best stores (leaving out the horizontal exit factor for the moment) in from 8 to 10 minutes. Horizontal exits, especially where two or more are provided, are considered to have such unusual life safety value in a building where control of occupants is substantially possible, that very generous credit is proposed for horizontal exits, and emptying time via stairs and elevators as high as 30 minutes is being considered for the finest structures.

STAIR AND ELEVATOR REQUIREMENTS

It is deemed essential to make an allowance for passenger elevators in getting persons out of retail stores, partly because customers and clerks use elevators so largely, and partly because the number of elevators is generally large and the capacity per trip considerable as a result.

It is proposed to develop an elevator capacity formula which may be expressed in an equivalent of stair capacity. It is proposed to make no capacity credit for unenclosed elevators where stairs may not be open, and to penalize open elevators in addition. Also the elevator capacity for which a credit is given must not be unduly large as compared to the required stairs.

In the following discussion the term "stairs" is intended to cover stairs and elevator capacity jointly.

Having established the number of persons on the basis of a unit such as 1,000 square feet, and an emptying time relativity factor on account of structural and protection features, the problem of establishing the amount of stair capacity is a relatively simple one. For example:

Assumed building has an area of 20,000 square feet, height of 6 stories above the street, and a maximum emptying time of 6 minutes.

Disregarding exits from first floor and basement, we are concerned with the second to sixth floors inclusive.

Assuming that an area of 50 square feet per person were finally established for these floors, the average number of persons on each floor for whom provision would have to be made would be 400.

Assuming 20 seconds required to travel down one story, the emptying time required to travel from the fourth floor (average distance above the street) to the outside would be three flights multiplied by 20 seconds, plus 30 seconds' allowance to reach stairs, and 30 seconds' allowance to get to street from end of flight in first story, or a total of 2 minutes.

The maximum time allowance is 6 minutes; therefore each unit of stair width is expected to take care of 3 sets of persons.

One set of persons will equal those on one flight of stairs and the corresponding hall and landing spaces. With one person on every other step and with one person for each 4 square feet of landing and hall space, an average stair may be expected to have something like 15 persons capacity per unit of stair width.

Three sets per unit of stair width will give a capacity of 45 persons per unit of

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stair width, and 400 persons per floor would require substantially 9 units or approximately 18 feet of combined stair width.

It is proposed to develop a final tabulation on the basis of number of feet (or fraction thereof) of required stair width per 1,000 square feet of floor space, without consideration of the horizontal exit feature. For that additional credits are contemplated such as

1. For one standard horizontal exit, 50 per cent.
2. For two standard horizontal exits, 100 per cent.
3. For three standard horizontal exits, 150 per cent.
4. For four standard horizontal exits, 200 per cent.

Horizontal exits must, of course, meet the standard requirements as to the areas of sections to which persons could move, size and number of door openings, fire doors, and also the relative floor levels between sections.

With the committee plan as finally developed, if a person contemplated building a store, he could tell at once from the tabulations whether a structure such as he had in mind would be permitted, and if so, how much stair width would be required. If he felt the stair requirement to be excessive, he could build a better structure or provide one or more horizontal exits. As a matter of fact, the fire section area limits proposed for new stores are such that any important structure will need at least one dividing wall.

If a person were considering an existing building, one glance at the tabulation will show him whether a building can be used as it then stands, and he can easily figure out what must be added in the way of division walls, stairs, protection of vertical openings, or sprinkler equipment to enable the building to be used for retail store purposes.

DEFINITIONS AND STANDARDS

Proper definitions and standards for various features of construction and protection will, of course, ultimately be prepared by the committee. Due consideration will be given to our factory egress code and to other National Fire Protection Association and National Board of Fire Underwriters' standards.

SPECIFIC EGRESS FEATURES

AISLES

Very important matters in retail stores are adequate aisles and unobstructed aisle space. Our investigations of existing stores indicate this latter feature to be violated to a very dangerous extent.

It is proposed to establish for main and for cross aisles a minimum percentage which the aggregate width of such aisles should bear to a building or section dimension and right angles to the aisles in question, and also to base the width of aisles, especially on the street floor, on the number of persons who may be called upon to use these aisles.

In a building where most of the occupants are not familiar with the location of stairs, it is particularly important that aisles be straight and that stairs be logically located and readily visible.

DISTANCES TO EXITS

The factory egress rule of not over 100 feet airline from any point to an exit is suggested for retail stores also. Airline is recommended as easier of application and a little more generous than the plan where distance is measured along the shortest normal line of travel.

NUMBER OF EXITS

Permitted forms of egress shall be inside stairs (open in some instances), smoke-proof towers, and horizontal exits. The committee doubts very much whether outside stairs, commonly called fire escapes, should receive any credits whatever. The committee is agreed on this point as regards new buildings.

Every floor or important section shall have at least two separate exits as remote from each other as practical, and never less than 40 feet apart. An opening to an inside stair, a smoke-proof tower, or horizontal exit shall be considered an exit under this rule. This rule shall not, however, make mandatory two exits from small workrooms, offices, or display rooms. For large areas, more than two exits will be needed, and the area basis is probably the best one that can be used

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Each fire section shall have at least one stair. This is not required in the factory egress code.

Elevators shall be distributed in moderate-sized banks, and in new buildings a reasonable amount of elevator capacity must be provided in each fire section.

Special study will be given the basement and sub-basement egress problems.

STAIRS

The same units of measurement, penalties for sub-standard conditions, and methods of calculating capacities of stairs which have been established for factory buildings can, it is believed, be used for retail stores.

Stairs should, where possible, discharge directly to the outside and street level (and also to the inside), and stairs not so discharging should be penalized. To pour thousands of persons into the street level story, where fire might be raging, is obviously less safe than to discharge those who use stairs directly to the outside.

HORIZONTAL EXITS

Some special study of the horizontal exit feature as related to the retail store will undoubtedly be needed because of the great variation in departments in the amount of open floor space which a large crowd could occupy.

LIGHT WELLS

Open light wells constitute so serious a menace that your committee contemplates severe penalties where such wells exist.

ELEVATORS

In establishing the value of elevators as a means of getting persons out of a building consideration must be given to the number of elevators, area of cages, height of building, speed of elevators, safety of elevator machinery, enclosure of shafts, emptying time allowed for the building, and possibly other factors. It is expected to develop a formula or a special tabulation to convert elevator capacity into stair capacity.

STREET LEVEL EXITS

There must be a definite relation between the aggregate width of the exits and all of the persons that may be accommodated by the building. This naturally carries with it a proper relation between the exits and the aisles leading specifically to them.

Minimum widths need to be established for such exits.

It is particularly important that street level exits bear a simple relation to stairs and elevators, and that these exits be not too far apart. A building with exits at two ends is not as safe as one with exits on four sides.

The collapsible revolving door apparently is an operating necessity, but a retail store should have at least a reasonable proportion of its total door capacity in the form of ordinary doors swinging outward.

SIGNS

There is need of generous treatment as regards elevator, usual stair, and special fire exit stair signs. It is necessary that these signs be readily visible, preferably being well over head and across the normal line of travel and sight.

No obstruction of signs by decorations should be permitted at any time, and obviously no removal of signs tolerated.

OCCUPANCY

While it is undoubtedly desirable that retail stores be assumed to have some average occupancy hazard, special treatment of the special hazards is undoubtedly warranted. Various minor manufacturing operations, kitchens and restaurants, and packing operations are the principal hazards found in the average store of considerable size. Treatment can take the form of placing of these hazards as near the top of the building as possible, of segregating them by special fire resistive partitions, and of installing sprinklers in those locations where the buildings are not generally protected.

SAFETY TO LIFE IN SCHOOLS

Although it is not possible at the present time to present to the association definite recommendations for adoption in relation to the exit capacities and permissible numbers of occupants of school buildings, the committee has devoted con-

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siderable thought to this subject. The skeleton report submitted herewith indicates the lines along which the problems are being attacked, and may be the means of eliciting helpful suggestions and criticisms.

It will be observed that the general outline follows as closely as may be the plan already adopted in the case of factory buildings.

DEFINITIONS AND STANDARDS

TYPES OF SCHOOLHOUSE BUILDING CONSTRUCTION

Class A construction means a building of fire-resistive construction in its walls, floors, stairways, and ceilings, and with wood finish, wood or composition floor surface and wood roof construction over fire-resistive ceiling.

Class B construction means a building with masonry walls, fire-resistive corridors and stairways, but with ordinary construction otherwise, *i.e.*, wooden joists, partitions, roof and finish.

Class C construction means a building with masonry walls, but otherwise ordinary or joist construction and wood finish.

Class D construction means a frame building with wood above foundation with or without slate or other semi-fire-resistive material on roof.

The foregoing classifications are recognized by school architects and educators. School buildings of fire-resistive construction throughout are very rare, as other than wood floors are not favored by educators. From a life safety standpoint Class A buildings may be grouped with those of strictly fire-resistive construction.

PROTECTION OF VERTICAL OPENINGS

Standard protection of all vertical openings is recommended, and the absence of such protection shall be penalized by a reduction of the permissible number of occupants as in the case of factory buildings. A detailed scale of penalties will be submitted after further study.

NUMBER AND LOCATION OF EXITS

Not less than two inside stairs remote from each other shall be provided from every floor, including basements.

Exits shall be so arranged with regard to corridors that there are no pockets or dead ends in which pupils might be trapped.

Exits shall be so located that no point in any floor area served by them shall be more than 75 feet distant from an exit, except in buildings of Class A construction, in which a distance of 100 feet may be permitted.

Every room habitually used by more than three pupils shall have at least two means of egress. In case these egresses finally open upon the same corridor, the openings into the corridor shall be on opposite sides of a smoke-resistive door, and shall give access to independent stairways.

STAIR CONSTRUCTION

The standards of the Building Code of the National Board of Fire Underwriters as to stair construction are generally applicable to school buildings, except that the following requirements shall in every case be met:

Stairways in new buildings shall in every case be enclosed in fire-resistive walls and entered through self-closing smoke-resistive doors.

(By a smoke-resistive door is meant a light door of solid construction without thin wood panels, and usually provided with a wired-glass pane.)

The space beneath every stairway built wholly or in part of combustible material shall be completely enclosed without door or other opening, adequate ventilation being provided to prevent dry rot.

Solid balustrades only shall be provided where balustrades are necessary.

Every stairway over 5 feet in width shall be provided with continuous intermediate hand-rail substantially supported. (To be re-written.)

Risers shall not exceed 7 inches in height, and treads, exclusive of nosing, shall not be less than 9½ inches, nor more than 10½ inches in width.

Stairways exceeding 9 feet in height shall have an intermediate landing equal in length to the width of the stair. In stairways with change of direction

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the corners of the landing shall be filled in to the height of the handrail, and the handrail on the wall side shall be continuous around the landing in the form of a semi-circle, with the newel of the stair as the center.

Stairs shall always open directly on the street or to a yard or court connected with the street.

Winders shall be absolutely prohibited.

Vestibules shall be so designed as not to exceed the width of the door frame at the door opening, and the walls shall extend in a straight line from the door frame to the widest point at the foot of the stairs.

Stairways from corridors to main exits shall not be split into two flights discharging opposite each other to the same exit door.

All stairs leading to basements shall be enclosed by fire-resistive walls, and smoke-resistive doors shall be provided at top and bottom of such stairs.

STAIRS (LANDINGS)

No door shall open immediately upon a stairway, but a landing at least the width of the door shall be provided between such door and stairway. Landings 6 inches wider than door when open shall be provided between egress doors and a step down.

OUTSIDE STAIRS

Outside stairs from upper floors shall be prohibited in new school buildings.

Outside stairs which do not comply with the Specifications for Outside Stairs approved by the National Fire Protection Association shall be disregarded in determining exit capacities of existing school buildings.

Outside stairs on existing buildings which comply with the approved specifications and with such other requirements as this committee may, as the result of its further study specify for safe use by school children, shall be rated at one-half the capacity of inside stairs calculated in the manner provided by these rules.

HORIZONTAL EXITS

The standards of the National Board Building Code as to horizontal exits are generally applicable to school buildings, except that doors shall be of smoke-resistive type as defined in these rules, that gradients shall in no case exceed 1 foot in 8 feet and that the floor of any bridge or balcony shall be not more than 7 inches below the door sill opening upon it.

Where two stairways leading into a basement are separated by a partition, such partition shall be of fire-resistive construction, and a smoke-resistive door shall be installed therein.

Note.—In cases where it is necessary to keep the door ordinarily locked (as when the partition separates girls and boys), the means of locking shall be by an approved device that will permit the door to be opened readily from either side in the event of fire.

DOORS

Smoke-resistive doors are preferable in school buildings to standard fire doors, as the latter may be too heavy for the pupils to open. (See definition under Stair Construction above.)

Doors giving access to means of egress shall swing with the travel. Sliding doors are not permissible between classrooms and corridors, corridors and stairways, or stairways and the outer air.

Doors when open shall not reduce the effective width of corridors or stairs.

Doors of rooms used by pupils shall have locks of such construction that they will at all times open readily from the inside without the use of keys.

The glass panels of doors opening on a corridor shall be wired glass.

Revolving doors shall not be used as means of exit.

Exterior doors shall have glass panes and shall be operated by bars or other panic-proof hardware device.

WIDTH OF DOORS

No door used for egress by pupils shall be less than 3 feet or more than 3 feet 2 inches wide, except double doors, which shall be not less than 2 feet 6 inches nor more than 2 feet 8 inches wide each.

DOORWAYS

The aggregate clear width of doorways

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serving as an exit from any room or floor area to a hallway, stairs or other means of exit shall be not less than 36 inches for the first 50 persons to be accommodated thereby, and 6 inches additional for each additional 50 persons or fraction thereof.

CORRIDORS AND HALLWAYS

All corridors and hallways in new buildings shall be surrounded with fire-resistive or fully fire-stopped partitions and have fire-resistive floor construction.

Corridors shall be straight, giving clear view of the stairway to be used.

Corridors shall not be less than 4 feet in width. Corridors serving as means of exit shall be at least equal in width to the width of stairways or corridors leading to them.

Corridor system of a building shall not be involved and shall not have dead ends or extend around corners out of sight of a means of egress.

Projections into corridors shall be prohibited.

Main corridors, passageways and hallways shall have width of at least 48 inches for the first 50 persons to be accommodated thereby, and 6 inches additional for each additional 50 persons or fraction thereof.

"FULLY FIRE-STOPPED"

The following specifications exemplify what is meant by "fully fire-stopped":

All elevator wells and light shafts, unless built of brick, shall be filled in flush between the wooden studs with fire-resistive materials and lined with metal or plastered on metallic lathing, and all woodwork inside of such wells or shafts be lined with tin plate, lock-jointed.

Where floor beams rest on partition caps or on girders, wall girts, or on wooden sills, fill in between such beams, from the caps, girders, girts or sills, to four inches above the plaster ground, solid with brick and mortar or other fire-resistive material.

When floor beams in frame buildings rest on ledger boards, fire-stop thoroughly at each floor with brick and mortar resting on bridging pieces cut in between the studs, or, where practicable, on the ends of lining floor.

In brick buildings the space between the furrings on the outside walls or on brick partitions shall be filled flush with mortar for a space of 5 inches in width above and below the floor beams of each story.

Where basement or other flights of stairs are enclosed by partitions of brick or wood, the spaces between the studs or wall furrings shall be so fire-stopped with brick and mortar as to effectually prevent any fire from passing up between such studs or furrings.

The soffits of all such enclosed stairs, and also partitions on stairway side, shall be plastered on metal lathing.

All long flights of stairs shall have smoke-stops in each flight, constructed as follows: Fill in solid between the soffit of the stair and the stair tread with metal lath and cement plaster at the first and last steps of each flight.

A space of at least one inch shall be left between all woodwork and the brick flues, also around all hot-air, steam and hot-water pipes; these spaces around flues and pipes, where they pass through floors, shall be stopped with metal or other fire-resistive material, smoke-tight. Steam and hot-water pipes shall have metal sleeves and collars.

All channels and pockets for gas, water and soil-pipes to be made smoke-tight at each floor.

The space around all metal or brick ventilating ducts shall be fire-stopped at each floor with metal or other fire-resistive material.

FIRE DIVISIONS

Buildings or sections of buildings having greater area than 20,000 square feet shall be divided by fire-resistive partitions into two or more sections connected by horizontal exits through or around the dividing partitions. Each section shall have one or more stairways, including one enclosed stairway.

ASSEMBLY HALLS

Where the seats in a school assembly hall are firmly secured to the floor, the

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requirements of the National Board Building Code as to capacity, seats, gallery platforms, aisles, cross aisles, steps in exits, floors at exits, passages, and emergency exits of theaters are applicable, except as hereinafter provided.

Where the seats are not fixed, the requirements of Part XXXIII of the National Board Building Code relating to assembly halls other than theaters are applicable, except that in cases where seats are fastened together in rows, but not permanently secured to the floor, the capacity of the hall as permitted by the code shall be reduced by one-third, and except as otherwise hereinafter provided.

No room above the second floor in a school building shall be used as an assembly hall.

Where an assembly hall is located above the first floor of a school building, the seating capacity which would be permitted in the same on the first floor shall be reduced by one-third.

CLASS ROOMS

All class rooms shall have aisles between desks and aisles along the walls.

In primary schools aisles between desks shall be at least 17 inches wide and wall aisles 2 feet 4 inches wide.

In grammar schools aisles between desks shall be at least 18 inches wide and wall aisles 2 feet 6 inches wide.

In high schools aisles between desks shall be at least 20 inches wide and wall aisles 3 feet wide.

Note.—The above are merely minimum widths. There is no objection to having wider aisles where this is considered desirable for administrative reasons.

BUILDING HEIGHT

No building accommodating primary or intermediate grades or pupils averaging 14 years or less shall be more than 3 stories nor the top floor more than 40 feet above grade at any outside door.

BASEMENTS

Class, recitation or study rooms shall not be located in basements if the floor levels are more than 2 feet below grade. In such rooms in existing buildings the permissible number of occupants shall be reduced by 10 per cent for each foot of rise to the outside exit.

Except the space used for heating apparatus and mechanical equipment, basements are regarded as undesirable in school buildings. Where basements exist, they shall be properly cut off from the rest of the building.

BOILER, FURNACE, AND FUEL ROOMS

Boiler, furnace, and fuel rooms shall be of thoroughly fire-resistive construction. They shall preferably be outside the building. If inside the building, they shall be cut off from the balance of the building by thoroughly fire-resistive walls. Openings from these rooms to the basement shall be provided with standard self-closing fire doors. It is best to have no opening from the basement to the boiler room, but to have the boiler room approached through a covered passageway connecting an outside basement door and an outside door to boiler room.

There shall be not less than one foot in height of open-air space between the tops of furnace or boiler casing or any smoke-pipe and the ceiling.

Floors over boiler and furnace rooms shall be of fire-resistive construction.

ELEVATORS

All elevators shall be enclosed in fire-resistive walls; doors to each shall be of standard construction and equipment.

STORAGE ROOMS

Storage rooms shall be surrounded with fire-resistive walls, and the ceilings over them shall be of wire lath and cement plaster 1 inch thick, or better.

FLUES AND AIR DUCTS

No wooden flue or air duct of any description shall be used for heating or ventilating purposes. (To be re-written.)

METHOD OF ESTABLISHING ALLOWABLE NUMBER OF OCCUPANTS

The same general method as that approved by the association in the case of factory buildings is proposed.

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For life safety purposes school buildings will be treated in three groups: (1) Fire-resistive and "Class A" construction; (2) Class B construction; and (3) Class C and Class D construction.

Each of these classes will then be subdivided into buildings having and not having fire-resistive or fully fire-stopped corridors, with a further subdivision as between "open stairs," "stairs enclosed or protected," and "all vertical openings protected," as in the factory rules.

In establishing credits and penalties for buildings under the headings already indicated sprinkler protection in basement, sprinkler protection up to the top floor of the school, and entire sprinkler protection, will probably be substituted for the high, moderate and low hazard occupancy classifications adopted for factories.

Due to the constantly changing methods of utilizing school buildings, it is proposed to base required exit capacities upon the total area. The units suggested are one person for each 15 square feet in rooms used for purposes of instruction, one person for each 6 square feet in assembly halls, one person for each 32 square feet in workshops, and one person for each 40 square feet in gymnasiums. The figure for gymnasiums is tentative only.

Allowance will be made in respect of horizontal exits as in the factory rules, but the permissible increase over the actual capacity of the stairs in the connected sections or buildings has been reserved for further consideration.

EQUIPMENT, HOUSEKEEPING AND MANAGEMENT

Although matters of housekeeping and management are in a different class from constructional features, their importance in school fire protection is so great that the committee has felt justified in preparing a separate memorandum with regard to them.

Due to the special nature of the occupancy, the hazard to life in school fires is of exceptional severity. Observance of the following precautions will reduce this exceptional hazard to a minimum:

1. Every building shall be equipped with an approved form of fire alarm system arranged to give a rapid dismissal signal which shall be the same in all schools in the same city. Signal gongs shall be placed on each floor, including the basement, and shall be used for dismissal only, signals to be operated by break-glass signal stations placed on each floor and a special operating station placed in the principal's office.

Note.—It is recommended that this signal be the 4-4 signal.

2. Fire drills organized in general accordance with the suggestions already adopted and promulgated by the National Fire Protection Association shall be held at frequent intervals.

Note.—The recommendations in this report will, if adopted, involve some minor changes when a reprint of the pamphlet incorporating the original suggestions becomes necessary.

3. Stairway terminals shall be kept free and clear of all obstructions.

4. All stairways, landings and passageways leading thereto shall be kept free from all furniture or anything that blocks or narrows the exits.

5. All clothes closets on half-story levels, opening on line of stairway, shall be discontinued unless there is a separate stairway leading thereto.

6. All doors of class rooms shall be kept entirely clear of encroaching furniture. There shall be a clear space at each door, and all seats that interfere therewith shall be removed. Furniture shall be removed from all aisles and passageways, which must be kept clear at all times.

7. Hooks, where used to hold stairway doors open, shall be replaced with automatic catches or holding devices.

8. Exit signs shall be provided and indicated by approved red lights, which shall be independent of the lighting system used for the rest of the building. The letters and figures on signs shall be not less than 5 inches high. All signs shall be of substantial material.

9. All doors from assembly rooms and doors from hallways shall be designated by exit signs, numbered on all floors alike; for instance, a stairway shall be numbered the same on all floors. After all stairways have been thus numbered, the succeeding numbers may be used for any other exits.

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10. In all buildings used as night schools and in all school buildings wherein lectures, etc., are given after school hours or after sunset to the general public, signs lighted by approved red lights shall be provided over all exit doors and stairways, and outside fire escapes shall be properly illuminated at night.

11. Exit signs shall be placed at all doors opening on stairs or passages leading to outside exits.

12. Where entrances to stairways through halls or other exits do not permit of exit signs being readily seen, additional sign or signs shall be placed and, if necessary, arranged to project from side wall.

13. Attics and open cellars shall not be used for the storage of furniture, books, lumber, etc.

14. Pupils' individual desks, wherein pockets (or other receptacles) are provided for books, must be cleared out and kept clean of all unnecessary accumulations of paper, rags, etc.

15. Students' benches and the floor in carpentry class rooms shall be kept clear of all accumulations of sawdust, shavings and litter of all kinds.

16. Cotton waste shall be kept in metal boxes or cans with self-closing tops.

17. Metal receptacles, with automatic closing covers, shall be provided for waste paper and refuse in all playrooms and lunchrooms. Each receptacle shall be about the size of the standard ash can. There shall be one can for each 500 boys and one can for each 500 girls in playrooms.

18. Unprotected wood enclosures shall not be maintained about boilers, machinery, pumps, coal bins, etc.

19. In wardrobes, all steam coils, radiators or pipes shall be protected by a screen or heavy wire netting so that clothing may not come in contact therewith.

20. Swinging gas brackets shall not be used for any purpose. Only short, stiff brackets shall be used.

21. Flexible tubing shall not be used for connections for gas ranges or gas stoves, nor for burners at tables or benches.

22. Woodwork at or near gas stoves shall be carefully protected by stone linings or by metal lined with asbestos.

23. No gas stove or hot plate shall be placed upon a wood top table or other similar service unless protected by two sheets of asbestos covered by two sheets of metal.

24. Extra chemical fire extinguishers shall be provided in each room where there are classes in carpentry, chemistry, sewing, etc., or in any other rooms containing combustible material of any kind, other than books. Additional extinguishers shall be also provided on floors having more than 10,000 square feet area.

25. Water connection, with length of small hose attached, shall be placed in all furnace rooms for use about ash-pits, and similar connections shall be placed where waste paper or other refuse is burned.

26. No oil of any kind shall be applied to wood floors.

[EDITORIAL NOTE: The American Institute of Architects and the National Education Association are giving consideration to the subject of fire dangers in schools and will cooperate with the committee of the National Fire Protection Association. Questions that the discussions developed at the annual meeting of the National Fire Protection Association related to the location of fire doors at the top or the bottom of stairs or in both places; the width of stairs, a suggestion being that 44 inches, as in factory buildings, would be about right; whether small school rooms need two exit doors; whether the installation of a fire alarm box or an auxiliary in the principal's office should not be required; whether outside stairs on low buildings in non-freezing climates should be prohibited; whether the committee should include in its report structural requirements that might conflict with the work of other committees having in hand the formulation of such standards, etc.]

Are you interested in a plan which will give Safety Engineers the collective influence that is wielded by the other branches of engineering? If so, read Page 115.

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Training Our Future Workers in Safety

By Laura M. Roadifer

Director of Safety Education, Philadelphia Rapid Transit Company

THE results of safety education as directed among the men and women in industry have been so marked that the necessity for such work is no longer questioned.

But, considering that the first essential qualifications of the ideal employe in industry are good habits, power to concentrate, quickness of perception, ability to estimate the possibilities of danger, and to make quick as well as intelligent and definite decisions, and that it is only by the "keeping-everlastingly- at -it'" method of instruction in "safety" that the development of these qualities in the minds of the industrial multitude has been furthered, readily one sees what waste could have been eliminated, both in energy and human suffering, had these workers been trained to adopt habits of precaution before they were brought to face the hazardous inventions in modern industry.

Regardless of the different walks of life which our future workers might pursue, certainly a keen realization of self-preservation is everywhere necessary, and, if we believe the theory that impressions made on

The Safety Patrol

The Captain

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the malleable child mind are of lasting quality, we should see to it that "safety" instruction be given a prominent place among our children's early teachings.

Anyone who understands child psychology realizes that the subject of "Safety First" is fundamentally unattractive to young America because his natural tendencies are to indulge freely in all the hair-raising escapades his fertile brain can conceive. But, with proper presentation, the subject can be made one of intense interest.

THROUGH THE PUBLIC SCHOOLS

The public schools afford the best means of contact with the junior public and, with the co-operation of the Philadelphia school authorities, practical lessons, as outlined in the Philadelphia Rapid Transit Company's safety campaign are here being systematically taught.

Habits of precaution, the value of which are infinitely greater than can be derived from a long list of safety rules learned and followed, are gradually but effectively being instilled into the minds of these active youngsters, by training the powers of observation and appealing to reason and judgment rather than to fear.

Not merely knowing how to act under certain conditions, but being able to decide instantly how to act under any conditions is the result we are striving for, by means of the following methods:

Story-telling, that pleasant and interesting medium of instruction, has been adopted almost exclusively for teaching "safety" to small scholars to whom self-protection has so little meaning, and, all unconsciously at the story's end, providing the story has been well chosen, these little pupils have been inculcated with the first great fundamentals in "Safety First" application.

Talks of a more serious nature, containing real facts, but constructed to stimulate active interest according to modern methods of pedagogy, are given to the older students, facts presented to arouse individual responsibility and to bring to each listener a realization that he is in a sense "his brother's keeper."

THE SAFETY PATROL

From this last recognition has developed the most effective phase of our safety work in Philadelphia, namely, the "Safety Patrol." Each such organization, of which there are now 35, consists of a group of volunteers from the higher grades who have taken the following oath of office: "I promise on my honor to faithfully safeguard my own life and that of every pupil in my school." And, besides patrolling the dangerous crossings and assisting the little children to a safe landing on the other side of the streets, these "safety officers" have publicly renounced the joys of "hitching" and the many other tempting street diversions, which every year put so many out of the running.

Members of all the patrols have been organized into the "Junior Safety Council of Philadelphia," which organization meets monthly in the Chamber of Commerce assembly rooms. Prominent speakers are provided and discussions held as to ways and means by which Philadelphia can be made a safer city.

Decorated with badges and brightly colored arm bands with the words "safety patrol" in contrasting colors, these boys stand out conspicuously from the usual school group, and so dare not indulge in anything which might bring disgrace to an insignia which has won recognition from the prominent civic organizations.

Nor do the other scholars look with contempt upon the safety patrol officers because of "model" conduct. In fact a position on the patrol affords rank and prestige.

The sight of the corner "cop" no longer suggests a speedy departure to a hiding place; with co-operation between the patrols and the police department a friendly attitude has been established.

DECREASE IN ACCIDENTS NOTED

During the last 4 years, since the school children have been enlisted in this movement to conserve human life, our reports show a decrease in accidents to children of school age of 13½ per cent, and 32 fatalities less over the 4 years previous.

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A motion picture which shows the patrols in action as well as depicting the results of "before" and "after" the safety application, is being enthusiastically received by children of all ages.

"It may help, but accidents *will* happen!" sighs the condoner of carelessness. "Not on your life," says his Excellency, the Captain of the Safety Patrol, "not if you can pound a few of the safety ideas into a fellow's head when it's tender."

And the probability is, he's perfectly right!

Proposed New Sections of the New York Industrial Code

Fire Drills—Erection, Repair or Demolition of Buildings—Controversy Over Safety Ladders

HEARINGS were held by the Bureau of Industrial Code of the State Industrial Commission in Buffalo on July 21; in Rochester on July 22; in Syracuse on July 23; in Utica on July 24, and in New York City on July 28 on three proposed new sections of the Industrial Code of New York State.

THE PROPOSED NEW RULES

The first revises the rules for fire drills in factories.

The second tightens up existing rules to safeguard workers in compressed air.

The third is the first step toward a comprehensive code in New York State to safeguard those working on construction, alteration and demolition of buildings. This code standardizes ladders and scaffolding used in construction and repair work; prohibits acetylene generators except properly housed and placed as may be approved by the Industrial Commission; directs that all buildings under construction shall be lighted so that 10-point type can be read at any part of the stairway during working hours. Sanitary arrangements for those working in buildings must be provided in accordance with rules laid down. Boilers and engines must be regularly inspected by a competent person and shall be equipped with necessary devices to secure proper working conditions.

Commissioner James M. Lynch presided at the hearings, assisted by Commissioner Frances Perkins and Deputy Commissioners Richard J. Cullen and Thomas C. Eipper. Representatives of employers and employes interested in the new codes were in attendance and voiced their protests or approval. In the main both sides voiced approval of the codes, although minor changes were suggested.

CONSTRUCTION OF LADDERS

The only radical differences of opinion were over whether cleat ladders should be permitted even under the restrictions laid down in the proposed rules.

A. G. Davidson of the Cheesbro Company of New York City and Clarence York of the Schenectady plant of the General Electric Company stood out strongly for absolute prohibition of cleat ladders, while E. H. Dixon of the New York City Builders' Association and J. T. O'Brien, representing the Carpenters Unions, argued as strongly for the cleat ladder as just as safe a tool as the rung ladder.

It will be several weeks before the new codes reach the full Industrial Commission. When the latter body gives its approval then the codes have force and effect of statute law, and violation is a criminal offense under the New York State Penal Code.

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EDITORIAL

"GIMME A LIGHT"

THE lack of adequate and agreeable lighting is not felt by those who have never enjoyed it. Our ancestors with the tallow dip hailed the advent of the oil lamp as the ultimate; and the open arc of the "90s" seemed again to be the last word in industrial lighting.

The rapid progress marked by the enclosed-arc, flaming-arc (with soft core carbon), the graphitized filament and others, resulted in each succeeding type of installation being scrapped almost before the multitudes became more than dimly conscious that a new type of lamp was being used.

These lamps were sold to replace one another by the sales argument of "more light with less current." The more light you can get for the money seemed to be a logical buying policy for the industrial operator.

Finally there arose someone who combined with his electrical skill a knowledge of physiology, and he enunciated the then novel dictum that too much light was as bad as too little, that the best lighting was of an intensity that caused only normal dilation of the pupil of the eye, and which came from the right direction in the right amount. In short, the simulation of daylight conditions.

Then were created illuminating engineers. Today no one type of light can be considered superior to another without careful consideration of the conditions to be met and the kind of work to be done.

Wonderful advance has been made in this branch of engineering in a comparatively few years. Glare and shadow should both be things of the past, as both are active causes of accident. The proper amount of light, set in proper fixtures, properly maintained, gives working conditions which so materially affect the output of employes as to make the old "how many watts per candle?" basis seem ridiculous.

It is this that constitutes what one is hearing of every day as the "New Spirit in Lighting."

THE BUILDING OFFICIALS' CONFERENCE

"RESOLVED, that it is the sense of the Building Officials' Conference that for the better protection of the public against unsafe and illegal building, construction suitable legislation should be enacted by which building operations shall be restricted to architects, engineers, builders, superintendents of construction or others who may have, by proper evidence, shown their ability or capacity for undertaking such building operations, and on whom individual responsibility for the safe prosecution of the work and a compliance with the laws relating to buildings can be placed."

This is the text of the body of the principal resolution adopted by the Building Officials' Conference at Pittsburgh at their 1919 meeting, and if the conference had accomplished no more than the passing and publishing of this, urging, as it did, presentation of the matter to all State legislatures, it would have fully justified its convocation.

Substantial uniformity in building laws, extending not only over the United States but over the entire continent, would be a wholly desirable

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achievement, and contribute greatly to ultimate prosperity and security, but because of the absence of centralized authority having adequate jurisdiction it cannot be brought about by any legislative means, in advance of a general agreement among officials and municipalities as to the fundamental essentials.

It is a serious impediment to the struggle for general betterment and greater safety to life, let alone the appalling fire waste, that the bulk of local legislation in respect to building ordinances is subject to so great an extent to the exigencies of local politics, and the office of building commissioner held so largely in light esteem, too often as a mere political sinecure.

Just so long as public indifference and ignorance in this direction prevails to the present extent, just so long as it is possible for a single retail lumber dealer to hold up and defeat a fire limit law or an anti-wooden shingle ordinance, lest it curtail his profits, or a single showman to overthrow an attempt to secure better safeguarding of the use of films, and, inferentially at least, induce the local governing body to regard his private gains as of more lasting importance than public safety, and so long as the general lack of information permits this with little or no local protest, so long is fighting for better conditions a fight against odds.

The "get together" is one important remedy and, contrary to a somewhat prevalent opinion, it is not derogatory to any community that it shall avail itself of the experience of other communities or of experts that happen to be non-residents.

The subject is too great and varied for any one man to become a general expert from his own experience. Specialization is necessary, and experts in special lines not being, as the Irishman of tradition has it, "birds," and thus incapable of living in two places at once, it is evident that the absorption of non-resident experience is of much value.

This sense of local superiority in matters where local superiority is generally impossible, so carefully fostered by politicians, is a barrier to progress, and should be overcome as far as possible.

Of this nature are laws or rules forbidding officials to attend conventions, except at their own expense. To keep in touch with progress, to exchange views and have personal contact with recognized experts is of great value to the official, not in the way of personal financial profit, but in the way of enabling him to fulfill his public duty more efficiently and with better understanding—a strictly public benefit, not a personal one—for which the public, as an employer, should pay. Besides, we must always remember that a personal exposition is better impressed and better understood in general than the same matter would be in print.

Certainly no building official could have failed to benefit in excess of the cost of attendance in listening to the well-considered and thoughtful addresses at this convention, from men exceptionally qualified (which means qualified beyond the reach of less favorably circumstanced men) on subjects of vital interest to every building official.

It is a disappointment to find the active membership of so important an association at the extraordinary low limit of 31, when 3,100 would be far too small. If you would get ahead *in public service*, you gentlemen of official responsibility, the building departments must get together, and at least once a year contrive to forget that the universe does not center in Pumpkinville (even though Pumpkinville may have a million people or more), and that residence in your very important city is by no means a condition precedent to expert attainments of general value. There is not one among you who cannot learn something from some other person, and in its essence essential progress consists of getting that something, assimilating it mentally and putting it to service.

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Passenger Elevators

By Charles H. Weeks

Chief, Bureau of Structural Inspection, Department of Labor, New Jersey

THERE are very few elevators in manufacturing plants in the State of New Jersey that can be strictly termed passenger elevators and which are equipped exclusively for the carrying of passengers; but it is the general practice in many plants to allow persons to ride on the freight elevators. A concern that forbids the use of a freight elevator for any other purpose than the carrying of freight and allows only the operator to ride on the car is practicing a very important point in safety. If anyone, other than the operator, is allowed to ride on a car, it brings the car under the heading of passenger as well as freight.

Regular passenger elevator cars are not considered as dangerous as freight elevators, for the reason that all the protection as to capacity signs, car enclosures, safety devices, covering the car,

Fig. 1. This Elevator Has No Interlocking Device

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Fig. 2. Equipped with Shur-Loc Passenger Elevator Interlock

grating at top of shaft, and the clearance at top and bottom of the shaft, are generally provided for. A passenger elevator is not subject to the rough usage other types of elevators receive, and they are generally better looked after by having a regular operator handling the car, and in buildings have two or more elevators a supervisor or starter is employed.

The greatest hazards in connection with passenger elevators, as in freight elevators, are the dangerous shaft openings. Accidents have occurred by people falling down the shaft, caused by doors opening to the shaft not being properly closed and fastened, and people being caught between car and floor platform, caused by the starting of the car when the door to the shaft was open.

Fig. 1 shows a dangerous passenger elevator. This elevator does not contain a safety device that will keep the door closed, when the car is away from the landing. Note the person leaning into the shaft talking to operator while the car is in motion. This is a direct violation of all safety rules, and an accident is inevitable. The car in this elevator shaft can be operated with doors opened or unlocked when closed. It allows persons to open doors and look up and down the shaftway. The Department has on record many accidents in connection with elevators of this type.

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Fig. 3. Otis Elevator Company's Electrical Equipment

In order to prevent accidents of this character, a law was enacted in 1916, now on the statute books as Chapter 260, requiring building owners to place on their passenger elevators a device approved by the Commissioner of Labor for all manufacturing plants, bakeries and workshops, and for all other types of buildings by the local building departments. This device is to prevent the shaft doors being opened unless the car is at a desired floor level, and to prevent the car being started unless all doors are closed and fastened.

Fig. 2 shows an elevator equipped with a standard interlock. No one can open any of the elevator doors unless the car is at the desired floor level. This elevator is properly safeguarded in every respect.

The co-operation received from the local building departments has been very encouraging, and has resulted in having placed on passenger elevators devices that are both practical and serviceable, and which are now producing excellent results. Twelve different types of interlocking devices, both mechanical and electrical, have received the joint approval of the Commissioner of Labor and the local building inspectors. Such approvals are with the understanding that each interlocking device installed will meet in every detail the requirements of the De-

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partment of Labor Interlock Specifications, which is decided at an inspection made after the installation is complete.

There have been no fatal accidents reported in connection with passenger elevators in factory buildings during the past five years, but several have taken place in other types of buildings, all in connection with the shaft openings.

We have investigated many elevator accidents in connection with passenger elevator shaftways in other buildings than the ones used for manufacturing purposes, and have found that all of them have taken place at the shaft opening to and from the car platforms, which was due to careless car operators allowing people to step on and off car platform before it had come to a permanent stop and allowing persons riding on the car to expose themselves to passing shaftway unguarded by a platform folding gate.

We have not received a single report of either a fatal or non-fatal accident in connection with any elevator equipped with an improved interlocking device. This applies to all types of buildings.

A very important factor of safety for passenger elevators is the operators' care to follow rules and safety instructions, and not to crowd a car beyond its carrying capacity. The operator should always be warned to close the car platform gate before starting the car. The closing of the shaftway gate is necessary before the operator can start the car. Some elevators are so equipped that it is necessary to close both shaftway gate and car platform gate before the car can be operated. This makes an absolutely safe protection.

Fig. 3 shows the car platform with a folding gate on far side of car platform that is closed and locked before the car leaves the floor landing. This gate is also on the front opening side of the car platform which is now open, as well as the entrance door to shaftway. This elevator being equipped with standard interlocks, the car cannot be started until door is closed and locked.

Another very important instruction that will save wear and tear to an elevator equipment is to teach the operator to endeavor to stop at the door sill and not travel distances above and below the level before the car is brought to a permanent stop. This practice is noticeable on most passenger elevators. Some types of elevator installations make this practice more difficult than others.

Careful watch should be kept over the condition of the lifting cables and their connection and frequent tests made of the safety device.

The writer was called up to make an investigation of an accident in connection with an elevator car dropping from the first floor to the basement, a distance of about 12 feet, in one of our large industrial plants, the car platform containing about 15 women. This was a freight elevator, but used for passenger service also on special occasions. The dropping of the car was caused by a slight disarrangement of some of the overhead equipment.

The safety device acted all right, but it was necessary for the car to travel over 10 feet to get its momentum, after that it stopped within 2 feet. It did not strike the bottom of the shaft, and had the car been at the top of the shaft, the fall of the car would not have been greater than 12 feet. The women on the platform, however, were somewhat shaken up, but no other injury was experienced.

We recommended for this elevator a safety equipment that would act more promptly, and now the car has a device that will stop it within three feet.

A fatal accident took place in one of our hospitals in connection with a passenger elevator. One of the patients walked down the shaftway, thinking the door led to a washroom. It was in a dark hall and the elevator not locked.

Another fatal accident in an office building was found to be caused by a person stepping from the car platform, taking some books and stepping backward down the shaft. Someone from another story had started the car to one of the upper stories.

These fatal accidents should not have happened with a standard approved interlock properly installed.

Summing up the passenger elevator, it is the operator, interlocking device and safety locks that predominate as safety features. Of course, the entire equipment must also be carefully looked after.

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Responsibility for Safety in Mines and Elsewhere

By C. A. Allen

Mining Engineer, United States Bureau of Mines, Chief Mine Inspector for the Industrial Commission of Utah

TO prevent suffering from accident and diseases is one of the first duties, yet it will not be accomplished until every man assumes his part of the responsibility to keep things safe, not from a selfish motive, but because as a good citizen it is his duty. A number of years ago in old Mexico, back in the mountains away from wagon and railroads, the writer saw a tree that had been blown down across a trail over which long pack trains of mules and burros had to pass. One could easily see where the old trail had passed under the fallen tree, but in order to get by it a new trail had been worn, which climbed around on the side of the little valley. It would have taken about 30 minutes to chop the tree in two and get it out of the way, yet no one had done it, and for months, probably years, hundreds of tired animals had been forced to travel around it. The tree should have been cut, but every Mexican that passed there considered his own selfish interest and would not stop to do it. No one heeded what was for the general good of all. This is too often the attitute regarding little things that could be done in the mine to make it safer for everybody.

NOT CHIEFLY CARELESSNESS

The manager of a large insurance fund recently said that fully 90 per cent of the accidents reported to his fund are due to gross carelessness and are positively preventable. This statement was unquestionably made in all sincerity, but no figures were presented to substantiate it, and although carelessness causes an enormous number of accidents, the estimate of 90 per cent is probably too high. Figures from the metal mines of South Africa, given in Technical Paper 129 of the United States Bureau of Mines, place the blame for accidents as follows:

	Per cent.
Danger inherent to the work, or misadventure	56.03
Defective plant or material	3.93
Fault of injured person	17.10
Fault of management	12.24
Fault of foremen	11.33
Fault of others	5.93
Combined fault of injured person and management	3.44
Total	100.00

Of 12 deaths, which are chargeable to the coal and metal mines of the State of Utah in 1919, three, or 25 per cent, were unavoidable; two, or 16 2/3 per cent, were due to inexcusable carelessness on the part of the men killed; one to carelessness on the part of a fellow worker; and three, or 25 per cent, could have been avoided by sufficient foresight on the part of the officials of the company. There were two others, or 16 2/3 per cent, where there was doubt as to responsibility, and one might be attributed either to the man killed or to the foreman.

The fact that only 25 per cent of these deaths were caused by accidents absolutely unavoidable and that an equal percentage was due to inexcusable carelessness indicates only too clearly how much heartache and suffering can be prevented if everyone will bear his share of responsibility and personally practice "Safety First" at all times.

Two of the greatest causes of accidents that are the fault of the operator are false economy and trying unduly to force production.

Two of the greatest causes among the men are carelessness (laziness and

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indifference are about the same thing), and trying to force unduly their own daily production or tonnage. Carelessness underground applies to men and company officials alike and it must be guarded against personally by every man who works in or around the mine.

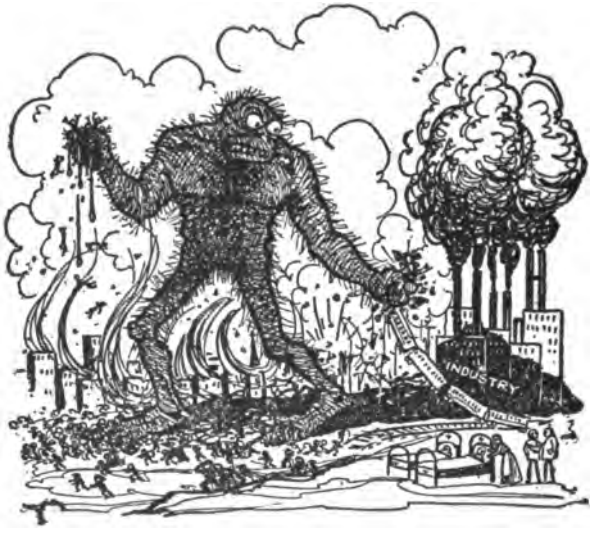
FALSE ECONOMY

The operator must make a financial success of his mine, otherwise it will not be operated. In an effort to reduce expenses construction and repairs are not done properly and accidents follow. The miner needs money and he tries to load all the cars he can and does not take time to put up timbers that he knows should be placed. In the long run neither the company nor the miner gain by not making everything safe and secure all the time.

Every man who goes underground, from mine manager to trapper boy, should study emergency treatment of injuries and make himself proficient in the rudiments of first aid. One of the finest sets of resolutions advancing the first-aid cause was adopted at the Indianapolis Convention of the United Mine Workers of America a few years ago, but in spite of this there are miners who will not learn first aid unless they are paid to do so, because they claim it is a benefit to the company to have them so trained. It is a benefit to the company for all of its men to know first aid, from manager to trapper boy; it is also a benefit to the community and to society in general, but more than all it is a benefit to the man himself, to his family that is near and dear to him, and to the "Buddy" who works at his side.

Is it not right that each one of us shall take all the responsibility for safety that he can, to the end "that the miner shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her old age; that his wife shall not be untimely a widow; that his children shall have a father, and that cripples and helpless wrecks, once strong men, shall no longer be a by-product of industry?"

"I Am Carelessness"



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Eye Hazards in the Building Trades

By J. Albert Robinson

Special Agent for Safety and Hygiene, Federal Board for Vocational Education

OUR eyes have been termed "the windows of the soul" or "the cameras of the brain." At the last congress of the National Safety Council one of the speakers said, "Our eyes are the windows which permit the light to enter, the cameras which photograph the objects we look at, they are the telegraph stations which notify the brain that a picture has been taken and of what it consists."

The hazards of the eyes in our industrial processes are pretty well recognized, and the methods for their elimination and the need for using suitable goggles are now common knowledge, even though there remains much to be done in correcting existing evils. It may not be generally appreciated, however, that serious eye hazards exist in the building trades. One is apt to think more in terms of dizzy heights and falls, of pointed nails and infections, and the hazards of handling the building materials, these constituting the greatest percentage of the accidents in construction work.

DEMOLITION

After a contract has been let for the construction of any piece of work, the first thing done is clearing the land and wrecking any structure that will interfere with the operations. This process of demolition introduces a number of hazards, but none more troublesome and often more serious than eye hazards. In the process of demolition a large amount of dust is sure to arise from plaster, mortar, crumbled brick, cement and other dirt. This dust is not only bad for the eyes, but dangerous for the lungs, and hence, the health of the workman. Flying pieces of material and chips and the dust from the general debris carried by the wind make eye injuries particularly liable to happen.

Dust masks are available as a protection when doing such dusty work, and they should be used on all such occasions. It is often desirable to use water to reduce the dust when tearing down plaster or brickwork. Screens may be used to prevent pieces of material from flying and injuring fellow workmen. This is true in the case of working with pick and bar in tearing down plaster, brick and other material that is demolished by striking so as to cause pieces to fly.

The use of suitable goggles should be encouraged for this class of work, and care should be taken to choose the design and quality that will give the best protection. Cheap goggles sold at 10-cent stores are worthless.

Much of the broken material and debris from the demolition of a building is shoveled into chutes from upper stories, and allowed to pass down to wagons below, waiting to receive it and haul it away. This process causes a heavy and dangerous dust to arise. It is an advantage to have the end of the chute inclosed in heavy canvas extending into the wagon or truck. This prevents the material from flying and keeps down the dust. The dust may be efficiently eliminated by the use of a spray of water discharging inside the chute near the bottom. A valve should be arranged so that the water may be turned on when loading the wagon.

OXY-ACETYLENE CUTTING AND WELDING

Many times steel trusses or beams are encountered which can often be cut in the process of demolition with the oxy-acetylene flame much more quickly and more cheaply than by other methods. This method of removing structural steel members offers a number of serious hazards, but none of more importance than the danger of injuring the eyes.

The processes of cutting and welding, in the actual erection work, especially in the modern type of structural steel build-

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ings, are also quite common, for such work as cutting copings, splicing and fitting rails and channels, I-beams and other shapes, cutting holes for rivets, welding up misdrilled holes, cutting of all kinds of gusset and splice plates, and welding structural parts where riveting is not possible.

The oxy-acetylene operators who use this powerful flame to cut and weld structural steel members are liable to temporary or even permanent injury because of the intense glare and action of ultra-violet, visible, or infra-red radiations on the eyes. The first of these will actually destroy the animal tissue, and loss of sight may occur within a short time. It is, therefore, very necessary to protect the eyes from the harmful rays of oxy-acetylene welding flames. This danger may be eliminated by the use of suitable goggles, containing very dark glasses. Dark yellow or brown glasses containing iron are recommended, but the exact kind of glass suitable for the work to be done should be obtained from reliable manufacturers of colored glass or goggles, and the use of correct colors should be compulsory even though the operator insists that his glasses are correct. Smoke, blue or green goggles furnished with the average oxy-acetylene outfit or purchased from local dealers are dangerous, as is easily shown by the inflammation and eye fatigue most welders experience after working hours.

MISCELLANEOUS PROCESSES

Plumbers who caulk the joints of pipe with melted lead are exposed to the danger of hot lead spatterings when the joint is filled, especially if any water has chanced to get on molten lead. Many persons have been severely burned and eyesight destroyed by spattering of the molten metal. The joint must be dry when the lead is poured. Water should always be kept from coming in contact with the melted lead. Suitable goggles should always be worn and, incidentally, the use of gloves may protect the hands against burns.

Wood alcohol poisoning causes very serious eye trouble. Impairment of sight and more or less complete blindness are not uncommon results of working in closed rooms with wood alcohol thinned varnish and shellac. Fortunately, wood alcohol has been largely displaced by denatured alcohol for use in painting, although certain market conditions have made its continued use possible.

TIMELY EDUCATIONAL BULLETIN

Although a considerable amount of attention has been devoted to accident prevention on railroads and in manufacturing industries, construction work has been almost entirely neglected in this respect. The Federal Board for Vocational Education, Washington, D. C., has just issued a most timely bulletin, entitled "Training Courses in Safety and Hygiene in the Building Trades," Bulletin No. 31, which should be very helpful to those desirous of studying the hazards and methods of safeguarding against accident in the building trades.

Either a Slogan or a Fact

"SAFETY FIRST" can be either a slogan or a fact, *Colliers* remarks. The latter is preferable. One of the big steel companies recently studied its 1,642 accidents incurred during three years of the war period and classified them as to results into those which disabled men for six weeks or less (86 per cent of the total), those which disabled for over six weeks (10 per cent), and those which crippled or killed (4 per cent). These classes were then sorted out as to preventability between those which were "trade risks" (27 per cent of the total), those which the worker could avoid by being careful (66 per cent), and those which called for changes in machinery or in methods of work (7 per cent). These "engineering revision" cases, as the technical men call them, made up over one-half of the really bad accidents. Studies of this kind should be made for every trade in which people are hurt, and in the long run the employers who make such studies and use them will lead in their field.

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"Safety Last"

By Mrs. D. S. Beyer (Maria Conde)

Maria Conde

IS your engine unprotected?
Safety last!
Are the plans for guards rejected?
Safety last!
Pat it gently on the gear,
By the middle of next year
You will likely not be here!
Safety Last!

Never label stairways "Danger,"
Safety last!
Do not warn the passing stranger,
Safety last!
If you tumble down the stair,
Break your leg or muss your hair,
It's a fine excuse to swear!
Safety Last!

Is your emery wheel a menace?
Safety last!
Has it blinded Mike or Dennis?
Safety last!
Never worry, never weep,
Do not groan when you're asleep,
Compensation bills are cheap,
Safety Last!

[Mrs. Beyer (Maria Conde) is the wife of the Vice-President and Chief Engineer of the Liberty Mutual Insurance Company of Boston. Her début in Metropolitan Opera in December, 1917, was an event in the world of music. "The voice of a generation," the New York *Evening Sun* commented. She has been particularly complimented, as a charming Gilda, for her rendering of "Caro Nome" in her duet, with Caruso as the Duke. She possesses talent as a writer of delightful verses and many of her poems have been set to music by the eminent composer, Frank La Forge. Mrs. Beyer has recently attended safety rallies, as her husband is interested in industrial accident prevention. SAFETY ENGINEERING has the honor of being the first publisher of her verses, entitled "Safety Last."]

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Safety News and Comment

Dangerous Conditions in Kansas City

FIRST, too many street accidents. In Detroit, where 60,000 motor cars travel the streets daily, the total deaths were only 192 last year compared with Kansas City's 255. This was an increase of 35 over the total the year before. The largest number of deaths was due to motor car and motor cycle accidents, 65 persons being killed as compared to 60 in 1917. Field Secretary F. E. Morris of the National Safety Council is endeavoring to increase the interest in safety work in Kansas City.

Second, the matter of fire alarms. Neither Kansas City, Mo., nor Kansas City, Kan., has a fire alarm telegraph system, hence the recommendation of the Kansas Inspection Bureau is very significant, viz.: "Fire alarm telegraph boxes are necessary in all mercantile and manufacturing districts." The avoidance of delayed fire alarms is an important part of the responsibility of the safety engineer of every large plant. In October, 1917, a loss of $1,250,000 occurred in the Kansas City stock yards. A watchman tried, unsuccessfully, to send an alarm from an A. D. T. box. Six minutes later the fire department got an alarm by telephone from a coal office half a mile from the fire.

Elevator Accidents in Detroit

THIRTEEN persons have been killed in elevator accidents in Detroit since March 15, 1918, according to figures submitted to the City Council of that city on June 25, following a fatal accident in an office building, by which a young woman lost her life.

Robert A. Shaw, chairman of the publicity committee of the Detroit Safety Council of the National Safety Council, addressed the following letter to the Mayor of Detroit on June 26:

It seems as though we have read very frequently in the past few months of elevator accidents in the down town office buildings ıd stores, and in too many cases the result has been fatal. The horrible death of the young woman in the Ford building on June 22 brings the matter to mind very forcibly again.

I have heard the point made that women operators have been concerned in most of these accidents and tragedies. If so, it only serves to point more forcibly to the source of the whole trouble in not less than 99 per cent of the cases.

It is the lack of electrical or mechanical locks on these elevators that makes possible these horrors. To my personal knowledge, every large elevator company provides simple reliable locks which make it *impossible* to start a car before the door is closed. I find from personal inspection that the cars in many of our office buildings have this safety equipment installed, but it has been deliberately put out of commission because the cars can be operated a trifle more speedily without it.

As you have probably noticed, every passenger elevator in the Ford Motor Company offices and factory is equipped with such safety locks. My suggestion would be a $500 fine for every passenger elevator operated without this simple and necessary safety device. With this backing your department of Safety Engineering could speedily put an end to these "accidents," which are but the natural result of criminal negligence on the part of the owners of these elevators.

Fatal Automobile Accidents

STATISTICS made public by the Prudential Insurance Company show that in 1918 there were 107.9 deaths from automobile accidents in New York City to every million inhabitants. This shows a gain of about 60 per cent over 1915 and 1916, when the average was 68 killed out of every million. Fatalities in the entire State increased during the 10 years from 1906 to 1916 more than 1,000 per cent, the jump being from 8 in every million to 81.4.

The cities with a larger death rate from this cause and the number killed per million of the population during 1918 are as follows: Buffalo, 190.5; Providence, 158.6; San Francisco, 155.9; Newark, 134.1, and St. Louis, 128.2.

The State with a larger motor fatality percentage and the number of deaths per million in 1916 are: California, 162.7; Connecticut, 177.7; Rhode Island, 86.3; Michigan, 83.5; New Jersey, 83.1, and Massachusetts, 81.7.

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Safety Work in Australia

A SYDNEY, N. S. W., subscriber, writing in regard to information and supplies for carrying on safety work in that country, says:

The safety movement is practically unknown in Australia, and as we are the pioneers, a file such as advertised in SAFETY ENGINEERING would give us a good lift along, provided, of course, that some one with an experience in this movement, such as yours, would recommend it.

Is it possible to get a photograph, of one or two of your factories that have interested themselves in "Safety First"? We should like to get the photograph of, say, a furniture factory, showing the safety signs, the guards, the bulletin boards, and so on. If any of these are available, we should be delighted to have them.

SAFETY ENGINEERING contains most interesting and useful information, and since we started our "Safety First" department, it has been our Bible. There is no doubt the Americans are very much alive in this movement.

In reading some of the articles in your magazine we notice that suggestions are made for employes to form a committee and draw up a book of rules to be used for the safe-working of the plant.

We should be deeply obliged if you would get from some of the firms who have these committees working a copy of the book of rules drawn up by them.

It will be of the greatest service to us here, and if there is any other matter which you think will be of interest to us, we should be grateful if you would let us have it.

Photographs or books of rules of the kind asked for will be forwarded to the inquirer if sent to SAFETY ENGINEERING. Or the name and address of the corporation will be forwarded to any reader who may desire to write direct.

Railroad's Victory for Safety

THE "Safety First" campaign of the Railroad Administration is reported to have been responsible for 569 fewer persons being killed during the first three months of 1919 than in the same period during 1918. The total number of accidents also was 9,709 less than during the opening three months of last year. The figures are impressive. If the same ratio of decrease is maintained throughout the calendar year, Director-General Hines will have scored a signal victory for greater safety in the operation of railroads.

The Tuberculosis Plague

ACCORDING to the National Tuberculosis Association, the increase in chronic diseases, and particularly the unsuspected extent of tuberculosis in this country, was startlingly revealed during the war.

First, tuberculosis alone causes annually 150,000 deaths in the United States. Yet, to the best of present-day scientific knowledge, the disease is not inherited. Infection, it is now believed, generally takes place during childhood. It is a result of carelessness, or more often sheer ignorance of the nature of the disease and the methods of avoiding infection.

Second, examination of men for the National Army revealed that tuberculosis is far more prevalent in this country than even the best informed authorities were aware. The official records of the War Department show that almost 100,000 men were rejected because they were suffering from unsuspected implantation of the germ.

Third, tuberculosis has increased enormously in Europe. Such statistics as are now available for foreign countries during the war period show that as the food supply fell off tuberculosis increased.

The National Tuberculosis Association is convinced that public and private health agencies must be stirred to redoubled efforts; public opinion must be aroused and a nation-wide educational campaign must be undertaken. Plans are now being formulated for carrying on such a campaign during the months of October, November and December. The effort will culminate in a Red Cross Christmas Seal Sale of unusual proportions.

Composite of Accident Statistics

THE American Smelting & Refining Company's accident reports show that the largest number of accidents occur to those who have not yet learned how to use their hands. Then follows the accidents where the feet are injured, many of these injuries being due to the failure of the employe to get a good hold on what

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he is lifting or carrying. He drops the material, and he hasn't learned how to get his feet away.. Then come injuries to the eyes, and in succession to the head, legs and arms.

The accident reports taken altogether would show for one man that he was hurt on a Tuesday in July at 10 o'clock in the morning, after he had been at work between two and three hours, that the man was 32 years old, was married, had been employed for several months, and was disabled by getting his hand hurt and the injury laid him up for 18½ days.

The Journalism of Safety

IT is to be noted with regret that the National Association of Manufacturers, at a recent meeting of its board of directors, discontinued the publication of the accident prevention supplement to *American Industries* known as "Preventive Appliances." It has been a welcome monthly publication to all accident preventionists and its appearance will be missed. As the former editor of the supplement is associated with SAFETY ENGINEERING, this magazine will continue to cover fully the field of accident prevention by the protective appliances that are an absolute necessity to the efficient and sound management of every industrial plant.

The Argument for Daylight Saving

A CHAIN of newspapers, strong advocates of Daylight Saving, epitomizes arguments in favor of continuing the practice in these words:

Daylight saving not only is health saving, in that it affords to the worker some daylight in which to enjoy the out of doors air, or to tend his home garden, and such things. Actually it means money in his pocket. In the summer of 1918, according to Fuel Director Garfield, the saving of coal to the nation, on account of the reduced requirements of gas and electric plants, aggregated 1,250,000 tons.

Also, there was an estimated average saving to householders of 35 per cent of the cost of domestic lighting.

The statistics of the American Federation of Labor show that industrial accidents were greatly reduced in number under the daylight saving law.

There are numberless good reasons why daylight saving should be perpetuated indefinitely, and not a single one why it should not be.

To abolish it would be a sad example of reversing the wheels of progress and national common sense.

C. B. and Q.'s No-Accident Week

IN "No Accident Week" on the C. B. & Q., the record showed a reduction of 94 per cent over the corresponding week in 1918—that is, only 5 accidents against 80. The report shows that during the period of 1918, corresponding with the "No Accident Week" of 1919, there was one accident to every 121 miles. During "No Accident Week" in 1919, there was one accident to every 550 miles, a decrease of 454 per cent.

In the week of 1918 corresponding with "No Accident Week" of 1919, there was one accident for every 671 men, and in 1919 there was one accident for every 3,270 men.

Equipping 80,000 Cars for Safety

THE application of safety appliances to the 80,000 cars remaining unequipped must be completed by September 1, by order of the railroad administration. The *Railroad Review* remarks:

The roads which hitherto have acted in this matter have done so on the basis of fitting out their own cars with the necessary ladders, grab irons and sill steps, these being of a type selected by each road as standard for its cars and conforming to the requirements of the law. The greatest trouble confronting the roads has been their inability to get their cars home in order to make these applications. Now, that the time is nearly up, the administration, mindful of the supposed fact that "we are all one big railroad now," proposes that anybody's material shall be applied to anybody's car, it being a matter of no consequence what the material is like so long as it conforms to the dimensions and is applied in the locations specified.

It will undoubtedly inflict considerable injury to the pride of those roads which have been careful of their standards to do this. The one consolation offered is that the application of safety appliances is held to be an improvement for which the owning road can be billed. So in fear of worse consequences, mindful of the clemency already allowed them, and with as much of the "one big family" spirit as they can muster, it behooves the big roads to make the best of a situation for which, it must be admitted, they themselves are pretty much to blame.

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Tag the Horse-Drawn Vehicle

MANY accidents attributed to automobiles are caused by horse drivers ignorant or neglectful of traffic rules, blundering into places where automobiles collide with them. Horse-drawn vehicles used for business should be as carefully regulated as any other street traffic, and should be held responsible for violations of the rules. They cannot be held responsible unless made identifiable, remarks the Washington *Post*, commenting with favor on Senator Sherman's bill to require the placing of identification tags on horse-drawn vehicles in the District of Columbia.

Safety Work in Shipyards

VICTOR T. NOONAN, director of safety for the Bethlehem Shipbuilding Corporation, Fore River, Quincy, Mass., during July visited all the large shipyards on the Atlantic Coast, about 15 in number, with a view to collecting information on the various methods adopted to prevent accidents in the shipbuilding industry.

Mr. Noonan has charge of accident prevention work at the Fore River plant and also at the Victory plant at Squantum, Mass., both plants employing over 25,000 men. At the Fore River plant Mr. Noonan is conducting a six months' campaign in all departments and at the end of that time a very beautiful silver cup will be awarded to the department having the fewest number of accidents in the six months' period. The cup will be awarded publicly in one of the theaters by the general manager. The department winning the cup will hold it for six months, when any other department can capture it.

Dangers from the Sky

AS a result of the fatal accident in Chicago by the fall of a dirigible balloon a few weeks ago, it is believed, the Chicago city council reported an ordinance prohibiting airplanes flying over the downtown district and markers will be placed to show the flyers the lanes by which they may approach and leave the city from the west. Lake Michigan, to the east, offers an easy avenue of approach from that direction. It is probable, also, that flying will be prohibited without a city license, and that heavy fines will be provided for violation of this rule.

It is interesting to note in connection with the ordinance that its constitutionality was upheld by the corporation counsel on the basis of a certain section contained in the old English common law, and handed down to the English from the statutes of ancient Rome. According to the interpretation of the ordinance, the owner of a certain piece of property owns not only the surface of the property, but everything beneath the surface as far as the center of the earth, where his jurisdiction ceases and the ownership of some antipodean begins. Similarly, the property owner is held in the ordinance to have jurisdiction of a column of atmosphere, immediately above and of the same lineal dimensions as his property and extending "to the sky." Under this interpretation an aviator or balloonist entering that column of air without permission of its "owner" is guilty of trespass.

Windows That Break Easily

RECENTLY a Kansas City trolley car jumped the track, struck a telephone pole and overturned. One passenger was killed. Eight others were injured, several of them cut by broken glass. An incidental lesson taught by this disaster is that dangers from glass splinters should be avoided as much as possible. Material for windows that is hard to break is obtainable and all trolley cars should be equipped with it.

The Go-Go, Stop-Stop Man

WHEN the Go-Go man says Stop-Stop, you must throw out your clutch, and jam on your brake and shift your gear, or you'll make a mistake, and get in Dutch, and, in sorrow and fear, you may go to jail with a cop-cop—when the Go-Go man says Stop-Stop.

—*E. J. W. in Evening Sun, N. Y.*

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 402 SAFETY EXECUTIVES SHOULD HAVE THE ASSET OF COURTESY.—Our thought until the past few months was directed compellingly to the problem of production. The supply of necessary goods was below the abnormal demand, which required immediate satisfaction. It was difficult to obtain raw materials and even more of a problem to have them transported in proper amounts on time. Everybody worked early and late to produce. Sales were dependent only on this factor. This is no longer true. Now that the unexpected stimulus has been removed, our widely expanded facilities for supplying commodities are dependent for their utility upon our ability to sell, to "put things across" to the body of consumers. This will be accomplished by causing them to sense their needs even more keenly, and create in them new desires. These desires, of course, must be legitimate.

Safety engineers have succeeded in setting seemingly reasonable standards for nearly all classes of occupancy and use. They are increasingly attentive to the perfecting of all known appliances and conditions. Since such a high percentage of unsafe conditions has been found to be the result of carelessness, it may be asserted that their production exceeds their sales. The Man On The Job has before him the clearly defined task of getting people to adopt what he is firmly convinced are sound and practicable safety ideas, devices and appliances. He is a salesman. His ware is safety. His clientele is Mr. Everyone.

Most certainly The Man On The Job must be possessed of technical knowledge; but he must have something more. The way in which he uses his information is as highly important. He is dealing with people. Emphasis changes then from ideas to personalities. These others may have ideas of their own, which, while not in opposition, may be indifferent. They must be won. Frequently a good safety idea will fight its battle and win unaided. More often it needs assistance. This can come only from its sponsor.

We are engaged in the particular work of legal administration. Though, through their representatives, our people have seen fit to incorporate in statute ways and means of minimizing accident and fatality from unsafe conditions, they are loathe to comply. While we have authority to compel, compulsion engenders ill-feeling. When that attitude is rooted little can be accomplished. It has been our practice, therefore, to get our constituency to conform to law in the same way that we would sell an article. It has succeeded. Out of 221 cases of illegality not one has ever been prosecuted in the courts. Much opposition has been encountered, but by courteous treatment and by kindly and helpful suggestion we have done more, we are sure, than had we used legitimately delegated power.

The best argument is accomplishment. The head of a private school caused some trouble a few years ago when he was requested to erect a fire escape. He finally installed one, but was disgruntled. His building was re-inspected last year, and as another more ample law had been passed, his establishment was no longer in conformity. The inspector courteously indicated the defects, and the gentleman not only carried out the proposed improvement without disturbance, but sent a letter to the department expressing gratitude for the manner in which the inspection was made. Courtesy made a friend and obtained desired results.

The secret of this inspector's success

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was courtesy. It was informed character, making proper contact, carrying its ideas and ideals without interruption. Unlike the electrical mechanism as carrier, however, it is, and of necessity must be, self-controlled. I recall an interview with a man who allowed his temper to assume the upper hand. He unhesitatingly entered into a tirade against everything in general. But he didn't gain. He was so angry that he could not direct his energy toward a purposeful result. What abilities he had, and they were considerable, were wasted. We must not hazard the attainment of safer conditions by personal frenzy. Perhaps this man might have avoided his failure had he recognized the other fellow's point of view. And there are always two sides.

Courtesy is always an asset; never a liability. It is capital that pays appreciable dividends. It wins friends. It overcomes enmities. Without courtesy, the most expert knowledge fails. With it, a less well-informed man succeeds. A safe safety policy is courtesy.

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No. 403 ALL INDUSTRIES.—INTELLIGENCE AND CO-OPERATION OF THE FOREMAN.—The success of your safety work will depend upon the merit of your safety organization. In all accident prevention work a great deal depends upon the intelligence and co-operation of the foreman in carrying out the safety provisions planned by the manager or superintendent.

I am a strong believer in the idea that the foreman is the best channel through which to bring the safety program into the men's daily work. The average workman will pay more heed to his foreman than to any other individual in the plant.

One thing that is overlooked in a great number of cases is the education of new men. It is safe to say that a large part of the accidents happen because employes are unfamiliar with the machines and safety devices. This is especially true of the foreigners, who are numerous in all establishments. Instruct all new men how to do their work in a safe manner. If the man happens to be a foreigner, get an interpreter, if necessary, but don't in any case let him meet with an accident because of your neglect.

Furthermore, a great proportion of the factory and workshop accidents are due to the clothing of workmen being caught in the machinery and the unfortunate person's being dragged into the wheels when it is impossible to break away from the iron grasp. My advice, especially for mechanics, is to wear overalls, instead of loose clothes, such as flying ties, open waists and coats, etc.

Suggestions to remedy defects or increase personal protection should be acted upon immediately. Let's try this and see if we can't make a careful man of the careless man.

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No. 404 TANNERY PIN WHEELS.—Pin wheels are designed and erected by the tanners to suit their own conditions, without due regard to making them safe to operate.

The "anchor," a safety device to prevent the drum from revolving while the operator is unloading hides, consists of a hook and chain. One end of the chain, fastened to a ring in the floor, is attached to a post, the operator passing the hook through a lug in the drum. This is in position only until such time as it becomes broken or the ring is pulled from its fastenings. After that if it is not repaired, the operator depends upon the tight and loose pulley belt shifter.

The loose pulley often "freezes" for lack of lubricant, or the belt shifter is not locked in position, then the drum starts to revolve and a man is killed.

The belt shifter consists of a wooden bar provided with holes, and a loose pin is placed in the holes to help the belt in the "in" or "off" position.

If the pins are lost or mislaid or the operator is not obliged to use them, we have the same fatality occur as through the failure of the anchor device.

The following specifications should be called for on pin wheels:

Pulleys. The loose pulley should be provided with a bronze bushing, and a standard grease cup should be attached to the pulley's hub. This eliminates the hazard of iron upon steel "freezing" through lack of oil.

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Belt shifter. Provide an eccentric cam belt shifting device, which will lock the belt on the "in" or "off" position.

Maintenance. See that the belt shifter is properly located and in good repair at all times, and that the loose pulley grease cup is regularly supplied with lubricant.

Prizes for July Articles

First Prize. No. 399. S. M. Masse, National Carbon Company, Inc., Cleveland, Ohio.

Second Prize. No. 400. R. E. Luhn, Jr., Director, Bureau of Correspondence, Texas State Tuberculosis Sanatorium, Carlsbad, Tex.

Third Prize. Honorable Mention. Clarence Parker, Safety Engineer, Everett, Wash.

Comments by Members of the Committee

I vote for article No. 400, although the other articles are good and it is difficult to decide which one is the best. The author of No. 400 brings up a point which is very well worth considering, in that an employe is more subjected to injuries when his mind is preoccupied with home worries and other matters. Also that a man's physical condition has a great deal to do with accidents, for a man enjoying good health will be on the alert in the performance of his work, and is less liable to fatigue—which also should be considered in accident prevention work.

Accident prevention is a scientific study and should be considered as such, for there are many phases of the work which are far reaching and important in conserving the most precious thing of all—Human Life. That will be one of the important business principles in the not far distant future.

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Article No. 400 certainly prescribes a good remedy for the prevention of a lot of accidents. It is a very well written article and its doctrines are worthy of a trial by all industries, large and small. It has my vote.

Railroad Foremen Will Discuss Safety

SAFETY methods, old and new, will be discussed at great length during the convention of the International Railway General Foremen's Association, Chicago, September 2 to 5. R. C. Richards, general claim agent of the Chicago & North Western, the "father of the 'Safety First' movement on American railroads," will be one of the chief speakers. A. F. Duffy, manager of the Safety Section, Division of Operation, Washington, D. C., will address the convention on the latest methods for eliminating unnecessary risks in shop practices.

Another Influenza Epidemic Expected

THE next annual meeting of the American Public Health Association is to be held in New Orleans, October 27-30. The central themes of discussion will be Southern health problems, including malaria, typhoid fever, hookworm, soil pollution, etc. The general belief among the health profession is that influenza will return next winter, and a full session will be devoted to that subject for the purpose of developing methods of control.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

CEMENT, TILE AND OTHER KILN INDUSTRIES

July 7, 1919. Glassboro, N. J. Whitney Glass Works. Main street. Glass bottle works. One 1½-story building, known as Factory No. 6, damaged. Walls, wood. Floors, wood. Roof, wood. Cause, oil. Fire started on floor. Discovered at about 12:10 a. m. Alarm, factory whistle. Duration, 1½ hours. Fire was spread by oil pipes. Private fire apparatus, five plugs, with hose. One person in building. Value of building and contents, $75,000. Property loss, $10,000.

CHURCHES

June 23, 1919. Philadelphia, Pa. Seventh Street Methodist Episcopal Church. Southwest corner of 7th and Norris streets. One 3-story church building damaged. Walls, stone. Floors, wood. Roof, slate. Fire started on first floor. Discovered by boy nearby at about 6:02 a. m. Alarm, telegraph. Duration, 3 hours. Stopped at roof. Means of escape, ordinary exits. No further information reported to SAFETY ENGINEERING.

COAL AND LUMBER YARDS

July 1, 1919. Danbury, Conn. Seifert & Goos. 353 Main street. Coal and lumber yard. Four 1- and 2-story buildings and 20-foot shed over railroad trestle. Walls, wood. Floors, wood. Roofs, wood. Cause, believed locomotive sparks. Fire started in barn. Discovered by boy, next door, at about 11:17 p. m. Alarm, street box. Duration, 12 hours. Stopped on same premises. Fire was spread by open frame construction. Firemen handicapped by burning hose. Private fire apparatus, none. Injured, 2 firemen. Eight horses burned. Value of buildings and contents, $50,000. Property loss, $10,000.

COLD STORAGE AND ICE PLANTS

June 22, 1919. Salisbury, Md. Salisbury Ice Plant. Brown street. Cold storage and ice plant. Several 1-story buildings damaged. Walls, wood, galvanized iron. Floors, cement. Roofs, wood, composition roofing. Fire started in fire room, in pile of dust. Discovered by firemen at about 6:30 p. m. Alarm, telephone. Duration, 8 hours. Stopped on same premises. Firemen handicapped by lack of sufficient water. Private fire apparatus, fire extinguishers, pump and hose. Persons in buildings, 9. Value of buildings and contents, $150,000. Property loss, total.

ELECTRIC TRACTION PROPERTIES

June 26, 1919. Meadville, Pa. Northwestern Pennsylvania Railway. North Main street extension. Storage for car supplies. One 1-story building destroyed. Walls, brick. Floors, cinders and wood. Roofs, tar paper. Cause, lighting system. Fire started in center of building. Discovered by employe at about 4 a. m. Alarm, telephone. Duration, 2 hours. Stopped when property was consumed. Location, outside city limits. Private fire apparatus, none. Value of building and contents, $40,000. Property loss, total.

CONFLAGRATIONS

May 20, 1919. Helper, Utah. Various mercantile buildings on Main street. Hotel, meat market, grocery, dry goods store. Fourteen buildings, ranging from 1 to 4 stories, destroyed. Walls, two, brick; one, stone; others, frame. Floors, wood. Roofs, wood. Fire started in dwelling. Discovered by passerby at

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about 12:30 a. m. Alarm, fire whistle. Duration, 2 hours. Stopped at Stone Hotel. Value of buildings and contents, $100,000. Property loss, not reported to SAFETY ENGINEERING. Valuable papers and records lost.

June 15, 1919. Placerville, Colo. Various buildings on Main street, consisting of hotel, garage, livery barn, pool halls, general store and dwellings. All the buildings were of 1-story, except 2-story hotel. Walls, frame. Floors, wood. Roofs, shingles. Cause, leaking gasoline tank in garage, match and cigar. Fire started in garage. Discovered by owner at about 1:30 p. m. Duration, about 3 hours. Stopped when block was burned. Fire was spread by frame construction. No fire department. Private fire apparatus, buckets. Injured, 1. Value of buildings and contents, $75,000, estimated. Property loss, $50,000. Records and papers were protected in safes.

June 28, 1919. Richardton, N. D. Various dwellings, mercantile buildings and sheds destroyed. Front street. Forty buildings, mostly 1½-stories, destroyed. Walls, frame. Floors, wood. Roofs, shingles, some metal. Cause, unknown. Fire started in elevator. Discovered by telegraph operator in depot at about 11:45. Alarm, bell. Under control in 5 hours. Stopped at next block. Firemen handicapped by high winds and insufficient supply of hose. Value of buildings and contents, $500,000. Property loss, $100,000.

GARAGES AND AUTO REPAIR SHOPS

June 18, 1919. Delaware, Ohio. Neville Bros. and others. 72 North Sandusky street. Garage and 2 dwellings. Three 2-story buildings destroyed. Walls, garage, brick; dwellings, wood. Concrete floor in garage. Roofs, wood covered with paper. Cause, unknown. Fire started in rear. Discovered by watchman at about 3 p. m. Alarm messenger. Duration, 4 hours. Stopped on same premises. Private fire apparatus, extinguishers. One person injured. Value of buildings and contents, $116,000. Property loss, $53,000.

June 18, 1919. Unity, Sask. Norton's garage and others. Main street. Garage, office building, dwelling. Three 1-story buildings damaged. Walls, wood. Floors, wood; cement; dirt. Roofs, rubberiod; shingles. Fire started in empty workshop. Discovered at about 12:45 p. m.. Alarm, fire bell. Duration, 1¼ hours. Fire was spread by oil-soaked woodwork. Private fire apparatus, hand chemicals. Persons in buildings, 3. Means of escape, ordinary exits. Value of buildings and contents, $15,000. Property loss, $10,000.

June 19, 1919. Dedham, Mass. Dedham Club. High street. Garage and stable. Two 1½-story buildings damaged. Walls, wood. Floors, wood. Roofs, wood. Fire started in garage. Discovered by passerby at about 10:10 p. m. Alarm, Box 43. Duration, 1 hour. Stopped on same premises. Value of buildings and contents, $22,000. Property loss, almost total.

GRAIN ELEVATORS

June 16, 1919. Beach, N. D. Elliot & Beck. Along Northern Pacific Ry. right of way. Grain elevator. One 3-story and annex building damaged. Walls, frame, cribbed. Floors, wood. Roofs, shingle. Cause, unknown. Fire started in annex. Discovered by passerby at about 1 a. m. Alarm, steam whistle. Duration, 3 hours. Stopped in building of origin. Private fire apparatus, none. Value of buildings and contents, $14,000. Property loss, not reported to SAFETY ENGINEERING. Records and correspondence protected in safe.

June 24, 1919. Red Oak, Iowa. Turner Brothers. Short street. Grain elevator. One 70-foot building damaged. Walls, ironclad. Floors, wood. Roof, roofing paper. Discovered by workmen at about 1:30. Alarm, telephone. Duration, 2 hours. Private fire apparatus, none. Value of buildings and contents, $18,000. Property loss, $10,000.

HOTELS, RESORT

June 21, 1919. Center Harbor, N. H. Colonial Hotel, A. E. Main street. Summer hotel. Two buildings destroyed, 5-story hotel and ice house attached. Walls, wood, and plaster. Floors, wood. Roofs, shingles. Fire

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started near top of chimney. Discovered by passerby at about 12:15 a. m. Alarm, telephone and church bell. Duration, 3 hours, hotel; ice house, 2 weeks. Stopped at cellar. Private fire apparatus, hose. Means of escape, ordinary exits. Value of buildings and contents, $60,000. Property loss, not reported to SAFETY ENGINEERING.

MANUFACTORIES, MISCELLANEOUS

July 2, 1919. Stroudsburg, Pa. International Boiler Works. King street, East Stroudsburg. Boiler manufacturing. One 1-story building damaged, upper plant. Walls, frame, galvanized iron. No floors. Roofs, galvanized iron. Cause, oil tank. Fire started in oil tank. Discovered by workmen at about 4:15 p. m. Alarm, fire whistle. Duration, 3 hours. Stopped at boiler shop. Persons in building, 50. Injured, 1. Means of escape, ordinary exits. Value of building and contents, $25,000. Property loss, $10,000.

July 5, 1919. Gaffney, S. C. Gaffney Manufacturing Company. 754 Railroad avenue. Manufacturers of print cloth. One 1-story building damaged. Walls, brick. Floor, wood. Roof, tin. Fire started in center of building. Discovered at about 6:30 p. m. Alarm, telephone. Duration, 20 minutes. Fire was confined to one room; retarded by fire walls. Private protection, general fire-fighting equipment owned by the mill. Value of building and contents, $100,000. Property loss, $300.

MERCANTILES, MISCELLANEOUS

June 26, 1919. Groveland, Cal. Cazzaetto Store and others. Main street. General merchandise. Six buildings, 1- and 2-story, damaged. Walls, lumber; concrete. Floors, wood. Roofs, paper. Discovered by hotel cashier at about 2:20 a. m. Duration, 3 hours. Stopped at Cazzaetto's dwelling. No fire department. Private fire apparatus, none. Persons in buildings, 40. Injured, 1. Value of buildings and contents, $40,000. Property loss, $30,000.

MERCANTILES, TENANT BUILDINGS

July 10, 1919. Watertown, N. Y. Taggart Block. 36 Public square. Business and tenement building. One 4-story building damaged. Walls, brick. Floors, wood. Roof, wood. Cause, papers in attic. Fire started in attic. Discovered by passerby at about 3:54 a. m. Alarm, street box. Duration, 9 hours. Confined to same building. Private fire apparatus, standpipe. Persons in building, 35. Means of escape, fire escapes and stairways. Value of building and contents, $300,000. Property loss, $10,000. Some records and valuable papers lost.

MINING PROPERTIES

June 19, 1919. Kellogg, Ida. Bunker Hill and Sullivan Mining Company. West of Kellogg city limits, at Bunker Hill and Sullivan. Mining, milling and smelting. Six 1-story buildings; 2-story sawmill; 800,000 feet of logs. Walls, frame. Floors, frame. Roofs, shingles. Cause, probably fire crackers. Fire started in sawmill. Discovered by yard employes at about 4:45 p. m. Alarm, telephone. Duration, 4 days, but under control in 5 hours. Stopped at rock crushing building. Firemen handicapped by lack of sufficient water pressure, owing to too many streams. Fire covered so much area that many streams were needed to protect other property. Private fire apparatus, several reels of hose. Value of buildings, $7,000; contents, $8,000; logs, $80,000; dwellings, $3,600. Property loss, $98,600.

MISCELLANEOUS

June 27, 1919, Ogden, Utah. Everfresh Products Company. Wall avenue and 20th street. Drying fruits and vegetables. One 2-story building destroyed. Walls, wood frame, covered with corrugated iron. Floors, wood. Roof, wood and felt. Cause, boys and matches. Fire started in grass outside. Discovered by neighbors at about 4:09 p. m. Alarm, telephone. Duration, 4 hours. Stopped when building was consumed. Fire was favored by frame flues, with which the building was filled inside. These were very dry, having been used for the passage of hot air to the evaporating room. Means of escape, doors. Value of building and contents, $25,000. Property loss, total.

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OFFICE BUILDINGS

June 27, 1919. St. Paul, Minn. St. Paul Gas Light Company. 41-43 East Sixth street. Office building. One 3-story building damaged. Walls, brick. Floors, wood. Roof, gravel. Fire started in rear, in basement. Discovered by watchman at about 9:52 p. m. Alarm, telephone. Duration, 4 hours. Stopped at basement. Injured, 2 firemen. Value of building and contents, $200,000, estimated. Property loss, $14,000. Valuable records and papers protected in safe.

PAINT, OIL AND VARNISH STOCKS

May 28, 1919. Lincoln, Neb. W. H. Green Paint & Wall Paper Store. 1527 O street. One 2-story building damaged. Walls, brick. Floors, wood. Roof, composition. Fire started on first floor, in rear. Discovered by owner at about 7:39 p. m. Alarm, telephone. Duration, 1½ hours. Stopped at first floor. Persons in building, 6. Value of building and contents, $26,000. Property loss, $6,000.

TEXTILE MILLS

June 20, 1919. St. Catharines, Ont. Canadian Flax Mills Company. Lincoln avenue. Preparing flax. Three 2-story buildings damaged. Walls, brick, galvanized iron. Floors, cement. Roofs, tar, gravel. Cause, electric wiring. Fire started in main building. Discovered by workman at about 7:10 a. m. Alarm, telephone. Duration, 2 hours. Stopped at main building. Firemen handicapped by distance from hydrant, small main, dead end. Private fire apparatus, small hose. Persons in buildings, 15. Value of buildings and contents, $45,000. Property loss, not reported to SAFETY ENGINEERING.

WAREHOUSES, PUBLIC STORES

June 16, 1919. Douglas, Ariz. Camp Jones, owned by U. S. Government. Outside of city limits. Warehouse and quartermaster's department. One 1-story building damaged. Walls, wood. Floor, wood. Roof, wood, covered with tar paper. Cause, incendiary. Fire started in center of building. Discovered by soldier on guard at about 10:05 p. m. Alarm, box. Duration, 8 hours. Stopped in building of origin. Firemen handicapped by lack of water pressure. Private fire apparatus, Army had three hose reels. Means of escape, ordinary exits. Value of building and contents, $500,000. Property loss, $500,000. Papers and records protected in safes.

WOODWORKERS

June 24, 1919. Braeside, Ont. Gillies Bros., Ltd., and others. Sawmill. Fire started at south end of mill, below sawing floor. Discovered by workmen, late in the afternoon. Collapsed in half hour.

There were 12 standpipes in the mill and adjoining it, within reach, with from 50 to 100 ft. of hose and a nozzle attached to each and ready for immediate use. Full pressure was on at the time the flames were discovered.

There were 3 pumps in the boiler house, all fitted so as to connect up the main water pipe with a 6-in. supply and a 6-in. discharge, but the water supply failed as soon as the steam-pipe between the boilers and engines collapsed, about 30 minutes after the fire started, leaving the mill water supply useless. The fire was so hot, however, that the men could not stand near enough to throw water on it.

Gillies Bros had their own steam fire engine, which was immediately put in use between the mill and the lumber yards to protect the latter, and later on, after the danger to the yards was over, it was used to extinguish the embers of the fire. The engine is equipped with some 1,200 ft. of standard rubber-lined hose, and it ran steadily for about 12 hours. They also had the fire engine from the town of Arnprior, about 3 miles distant, and the fireboat from McLachlin Bros., Arnprior, which gave assistance in keeping the fire from spreading, and in quenching the embers. The hose connections of Gillies Bros. are interchangeable with McLachlin Bros., and those of Arnprior, so that in case of necessity all can be used together.

No information reported to SAFETY ENGINEERING as to the value of the building and contents and the property loss.

July 1, 1919. Evansville, Ind. Theodore E. Rochtin. 714-18 High street. Planing mill, lumber yards. One 2-story building damaged. Walls, brick; frame. Floors, wood. Roof, tin, gravel. Cause, spontaneous combustion. Fire started in center of building. Discovered by railroad train crew at about 12:32 a. m. Alarm, box. Duration, 8 hours. Stopped at mill. Value of buildings and contents, $75,000, estimated. Property loss, not reported to SAFETY ENGINEERING.

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Literature of Safety

Accident Prevention, Fire Prevention, Hygiene, Sanitation, Miscellaneous

THE EMPLOYMENT OF WOMEN IN ACETYLENE WELDING. Prepared for the Woman's Branch of the Industrial Service Section of the Ordnance Department by Helen G. Fiske. Monthly Labor Review of the U. S. Bureau of Labor Statistics, May, 1919.

After describing the history, nature, character and training required for the work, Mrs. Fiske reports that the lighter forms of welding are particularly adapted to women. The hazards of explosion and burns have been nearly eliminated by the careful installation of equipment and detailed instructions to workers. Women should wear one-piece overalls, close-fitting caps and gauntlet gloves made of heat resistive material. Masks fitted with colored lens are usually only required for electric welders and would seem an excess of caution for lighter types. No one should be employed without normal eyesight. The chief health hazard appears to lie in exposure to sudden changes of cold and heat. A heavy apron to prevent burning holes in the uniform is also recommended.

POWER DRIVES FOR SEWING MACHINES. Chester G. Rausch. Bulletin of the Safety Institute of America, June, 1919.

This article is concerned with the heavier type of power-driven sewing machines, placed in gangs or rows. The old type where the power is distributed through a single horizontal shaft placed under the table is being supplanted by the newer installations where the motor is entirely enclosed. There are in operation, however, very many shops where the sewing macines are equipped with the driving shaft and pulley in a position that interferes with the free movement of the operator's feet and where the clothing and the hair of the operator can easily come into contact with the revolving shaft. The newer types have a transmission equipment consisting of entirely closed and guarded mechanism, allowing freedom of movement by the operator. The only moving parts to these types of machines being the small driving belt, the hand bar and the needle bar in the head of the machine above the table top, all other parts being enclosed or removed so as to make the entire transmission system safe against accident by contact.

THE STATUS OF INDUSTRIAL RELATIONS. L. P. Alford. Abstract of a paper presented at the Spring meeting of the A. S. M. E. at Detroit. June 16-19, 1919. *Mechanical Engineering*, June, 1919.

This paper reviews industrial relations since the Civil War and the engineer's part in the past, present and future in the solution of labor problems. Profit-sharing and welfare work have been failures because the motives behind them were not democratic but were favors substituted for justice. The "Safety-First" committees led the way to shop committees and industrial democracy and they began to open the eyes of industrial executives as to what might be accomplished once employes as a body had a chance to express their desires and opinions. The three present tendencies in the development of industrial relations seem to be:

1. The acceptance of the motive of service.
2. The willingness to consider workers in groups.
3. The tendency towards mutual or joint control as an expression of democratic ideals.

THE ULTRA-VIOLET AND VISIBLE TRANSMISSION OF EYE PROTECTIVE GLASSES. K. S. Gibson and H. J. McNichols, Washington, Bureau of Standards, 1919. Technical papers, No. 119.

An investigation undertaken by the Bureau of Standards on the spectral transmission of various glasses which are commercially promoted as valuable in protecting the eyes from harmful radiant energy.

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THE INFLAMMABILITY OF GAS BLACK. Alan Leighton, Assistant Chemist, United States Bureau of Mines. *India Rubber World,* May 1, 1919.

An experiment conducted at the plant of the B. F. Goodrich Co., Akron, Ohio. "It is apparent that if the gas black is explosive, its explosive properties will be due to the finely divided carbon rather than to the volatile content . . . The experiments show clearly that the sample of gas black is not easily ignited but that if conditions are right for ignition, it is very explosive. In other words gas black can be classed with other dangerous factory dusts."

STORING AND HANDLING HIGH EXPLOSIVES DURING THE WAR. G. C. Munoz, Major, U. S. A., Chief of Construction Section, Supply Division, Ordnance Department. *Engineering News-Record,* June 26, 1919.

A description of the seven seaboard depots for ammunition. The magazine storage houses for high explosives were built a standard size, 24 x 40 x 9 feet to contain a maximum amount of 250,000 lbs. each and stood 400 feet clear apart. Smokeless powder in bulk was stored in buildings 36 x 96 x 10 feet at a maximum capacity of 500,000 lbs. and cleared 300 feet apart. A standard policy for fire protection was adopted. The illustrations are numerous.

THREE YEARS ADMINISTRATION OF THE WORKMEN'S COMPENSATION ACT IN PENNSYLVANIA. Lee Solomon, Secretary of the Workmen's Compensation Board of Pennsylvania.

Pennsylvania reports a reduction of 28 per cent in accidents for 1918 as compared with 1916. The total number of accidents for the three years, 1916-1918, was 668,340, of which 9,143 were fatal. $12,296,847.89 was paid out while $14,886,312.03 represents unpaid claims or awards to be paid over an extended time. The amount paid for disability cases is not included in the above sum.

LANTERN SLIDE SERVICE, National Safety Council, Chicago.

This is a 16-page list of slides, conveniently divided into subject groups and covering a wide variety of hazards and safe practices. The slides are loaned to members of the Council to be used at lectures. A similar list of motion picture films was issued some time ago.

FIREMAN CIVIL SERVICE EXAMINATION INSTRUCTION. Third edition. Civil Service Chronicle, New York.

Covers every phase of entrance examinations for the fire department. A total of over 1,000 questions, answers, specimen questions and review questions. Includes New York, New Jersey and Chicago official specimens and instruction on fire fighting, use of appliances, etc.

Statistics show that 80 per cent of the applicants are rejected in the medical and physical examination, chiefly for defects that can be remedied. Of the 80 per cent who are re-examined, about 40 per cent pass. Most of the candidates rejected, after passing the physical tests, fail on account of ignorance of the requirements.

MISCELLANEOUS.

The Safety Bulletin of the Inland Steel Company for June contains a graphic article on the dangers in handling oxy-acetylene cylinders and portable gas tanks. One picture shows the proper and improper use of the burner, so that the material being burned will not fall on any part of the body of the welder. Other pictures show the handling of calcium carbide drums, oxy-acetylene tanks with improper hose connections, smoking near a gas tank and the safe way of carrying crude-oil burner tanks. The illustrations and accompanying descriptions are very pointed.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

SOL-LUX INDUSTRIAL LIGHTING EQUIPMENT

The lighting industry is fortunate in having such progressive manufacturers that they follow close on the heels of the scientist and frequently step ahead a bit and wait for a theory to catch up with its application.

Industrial lighting requires an equipment which is sturdy enough to withstand the severest use, simple enough to be installed by such skill as is available, and easy enough to clean, so that it will always be maintained in an efficient condition.

These qualifications seem to have been very successfully attained by George Cutter Co. of South Bend, Ind., in the line of fixtures which they have named SOL-LUX.

First the installation. Note in the accompanying illustration that only three operations are necessary for wiring holder sockets for attachment to conduit, and a complete fixture can be installed by one man in two minutes. First, the wires are pulled through the vertical opening in the porcelain socket and connected to the terminals, the reflector is then fastened to the socket by means of screws which engage in the boyonet slots in the top of the reflector. There are no loose wires to stuff back or washers and locknuts to adjust.

Fig. 1

The fixtures are water tight and have cast iron covers, heavily galvanized and painted. They will not corrode. The reflectors are insulated from the conduit and the terminals are protected from accidental short circuit. Cutter Holder Socket Reflectors are held rigidly in place and in a level position. The reflectors are in a correct position with respect to the lamp filament, thereby giving the distribution of light for which they were designed.

After these fixtures are installed with the Cutter automatic cut out hanger, they may be readily lowered from high positions, cleaned on the floor of the shop in a dead condition, and then quickly hoisted back to burning position without the use of ladders or the necessity of climbing along some eave or girder, in momentary danger of falling or of shock. Fig. 2 shows the cut-out hanger by itself and the completed fixture with the cut-out hanger is shown in Fig. 3. Those interested in further details should send to the manufacturers for the SOL-LUX Book, called Bulletin No. S.E, 3360, which contains charts, diagrams, sizes and such general matter as would be required by engineers considering installation.

Fig. 2

Fig. 3

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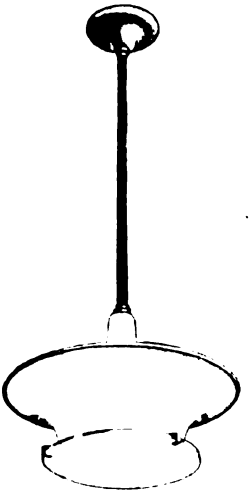
DUPLEX LIGHTING

The theory on which is based the design of Duplexalite fixtures is illustrated in Nature by the light found on the shady side of a tree on a sunny afternoon.

The modern high efficiency lamp when used in large units simulates the sun in being unbearable to the human eye and the light must be reflected and diffused in order to best utilize it.



The manufacturers of this type of fixture claim that "more than 96% of the light is deflected in useful directions; that is upward for ceiling reflection and downward for additional intensities. Less than 4% is given off at angles which produce glare, as compared with 30% to 45% usual with other systems in which any appreciable amount of direct lighting is provided."

The fixture illustrated is the standard Duplexalite and the illustration herewith of the drafting room equipped with this fixture shows a remarkable evenness of diffusion with an almost complete absence of shadows and glare.

A booklet entitled "The Light to Live With" describes the system in an attractive manner.

TRUMBULL ELECTRIC MFG. CO.

The Trumbull Electric Manufacturing Company announces that the General Electric Company has acquired a financial interest in their company, which, however, entails no change whatever in the present management, or personnel of the company.

It will be the policy of the company to sell its material through the same distributers as in the past, and on the same basis as to terms, price and service.

The business of the Trumbull Electric Manufacturing Company will be carried on in the future exactly as in the past in every particular.

Work has been started on a new factory for the manufacturing of Safety Switches, which will increase the floor space of the plant about 33⅓%. This addition was made necessary by the rapidly growing demand for their Safety Switches, and the entire new building will be devoted to the production of this one line.

"SAFETY THOUGHTS"

The June issue of "Safety Thoughts" which is issued by the Strong, Kennard & Nutt Company has just come to our attention. Like other issues of this folder, it contains many interesting, brief and well-told arguments on safety, quoted from safety engineers, industrial officials and SAFETY ENGINEERING. In connection with "Safety Thoughts" there is published with each issue an intsructive safety bulletin. The Strong, Kennard & Nutt Company will be pleased to put on their mail list anyone who desires to receive this folder regularly.

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Drafting room equipped with Duplexalites

DENZAR LIGHTING

"The Unit of Day Brightness" is the title and keynote of the catalogue of the Beardslee Chandelier Manufacturing Company describing the Denzar lighting fixture. The manufacturer states that the use of Denzar lighting in factories means greater production, decreased spoilage and accidents, better workmanship, greater utilization of facilities. The catalogue briefly describes and illustrates the several styles of Denzar fixtures.

The advantages of Denzar are:

Light source cannot be seen from any point.

Gives a light of day quality on the working plane.

Eliminates glare and deep shadows caused by the use of unguarded lights.

It is dust-proof and dirt-proof, therefore it retains its original lighting qualities indefinitely.

Eliminates the waste of light caused by the indirect method of lighting, which depends upon the ceiling for a reflector, without regard to the probable dark condition of the ceiling.

Utilizes all available rays of the economical high-powered Mazda "C" lamp, giving maximum light on the working plane.

Because Denzar utilizes all available rays of light fewer units are required to light a given space than are necessary with other methods of lighting, thereby reducing current cost.

INDUSTRIAL LIGHTING

In years gone by lighting of factories was considered merely a supplementary matter; just so there was light enough to see, the average employer considered that the factory would go along all right, but today he is learning that factory lighting is a matter of importance, not only to himself but to the workmen, affecting the efficiency of their production, as well as their health and safety.

Efficiency or accuracy is getting to be more of an essential point in production. Manufacturers are learning that the lack of accuracy causes decrease in quality of goods and waste of material. In former days a glare was considered simply a glare, nothing more nothing less. It did not occur to the factory superintendent and manufacturer in those days that a glare dazzled the eye, weakened it, and caused the workers to tire quicker than if they had been working under controlled illumination.

The manufacturing world has learned that light poorly diffused is wasted; that dark ceilings cause absorption, consequently loss of electrical power; that shadows on the floor cause accidents; and that lights cannot be placed haphazardly around a factory according to the wishes of the various workers, but that they must be apportioned carefully and scientifically so that those places which require more exertion on the part of the eyes are given better light to help them along.

Years ago night work was more or less of a bugbear to workers, many of them refusing to do it, but in these days when it is possible to have good lighting almost equal to day light the worker does not mind it so much and he finds that he can work through the long hours of the night without experiencing that dull feeling which used to take hold of the night workers. The night worker did not appreciate that it was simply the glaring and poorly diffused light that causes sleepiness and headaches on his part.

In 1917-1918, when the war was demanding day by day regular production, manufacturers looked to the lighting industry for a light which was not too expensive, which was practical, which gave the factory the most desirable light by which to work. Many of them choose the light which the Luminous Unit Company offered—Industrolite. This was because of its simplicity of design, durability, and economy

of installation. Its simple construction comprises an upper reflector of white porcelain enameled steel and a lower reflecting cone of the same material. The cone is positioned so that the eyes are protected from the direct glare of the lamp yet maximum efficiency is obtained. Proper ventilation insures its long lamp life with practically no efficiency drop. It is made so as to accommodate Mazda C lamps of output ranging from seventy-five to one thousand watts.

LIGHTEN THE GRIND

Unless you have the right lamps and the right-sized lamp in every socket, your employes work against a handicap of glare, or feeble light or shadows. This makes eye-strain, and headache follows. And when his head aches, no man can be either speedy or efficient..

And so poor light which you can easily prevent afflicts you with the many penalties of carelessness, inaccuracy, inattention, all contributing to accidents.

"Lighten the Grind," is a unique folder recently issued by the Franklin Incandescent Lamp Works of the Westinghouse Lamp Company which tells briefly the advantages of the Franklin Mazda Lamp.

WESTERN ELECTRIC COMPANY

As the safety engineer and industrial welfare expert are concerned with what the domestic conditions of the workmen are, they will naturally be interested in means and methods of lightening the household work.

Not long ago, Mrs. May Savell Croy, an

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expert on electrical house furnishings, installed a complete electrical kitchen and laundry in the new Bush Terminal Sales Building in New York. This is part of an "ideal cottage" in which the wonders of electricity are explained to visiting importers, exporters and buyers from all over the world.

Exporters who recently visited the exhibit were interested in knowing that a film had been made and wanted to know where they could see it. The film, "Table Cookery," was developed by The Society for Electrical Development and the Universal Film Company, and by courtesy of the Bush Terminal Company, an exhibit was arranged at which the society's films and one of the Western Electric Company were shown.

The society's staff works with various film companies to offer electrical suggestions, correct errors and devise useful educational propaganda. The society has prepared over a dozen special electrical moving picture films, in conjunction with the Universal Film Company, and has worked with the Western Electric Company and other manufacturers and jobbers to the same end.

Among the films shown at the exhibit were:
"The Home That Runs by Magic."
"Santa and the Wonderful Genie."
"Which One of These Is You?"
"Who Washes Your Clothes?"
"Current Convenience."
"The Heat Chaser."
"Table Cookery."
"A Square Deal for Your Wife" (Western Electric.)

A HANDBOOK OF EYE PROTECTION FOR THE INDUSTRIES

An interesting handbook of a very novel form entitled "A Handbook of Eye Protection for the Industries" has recently been issued by Strauss & Buegeleisen, Broadway & Howard street, New York City. This forty-eight page handbook is of the lose leaf variety, and it will be augmented from time to time with further data on eye protection and goggles manufactured by the above concern. Part of this handbook is devoted to a discussion on the prevention of eye accidents, a review of the U. S. Bureau of Standards reports on non-shatterable glass, and tests that you can perform on Resistal the laminated glass which the above concern uses in their goggles. The rest of the book is given over to the description of their protection and welding goggles.

Strauss & Buegeleisen will be pleased to furnish a copy to those interested upon request.

NEWMAN CLOCK COMPANY

If professional commendation is worth anything, the Newman Clock Company, Inc., of 178 Fulton street, New York, is to be congratulated upon the adoption of their equipment by the Architects Building, Engineers' Club and the Engineering Societies Building all of New York City. These buildings are all representative of the most advanced type of construction and are supposed to possess the most approved appliances in existence, inasmuch as the clientele of each building is of expert character.

The announcement of these equipments has just been made by the above company in a most attractive folder.

SAFETY GRINDING

Several novelties in design are claimed by the St. Louis Machine Tool Co., of St. Louis, Mo., for their No. 7-8-9 Grinder, which is here shown with wheel guard attached. This wheel guard covers the proper portion of the wheel, leaving the usual and necessary opening for grinding.

The nozzle for attaching pipe is of the proper size to meet the various State laws on sanitation, and is in direct line with the wheel; a point which is claimed to possess considerable advantage over the side outlet which is sometimes used.

The guard is adjustable backward, as the wheel wears, so that the lips can always be up close to the wheels, eliminating the chance of particles of work falling between the wheel and the guard, which is a frequent source of accident on this class of machinery.

EDISON STORAGE BATTERY CO. MOVES PITTSBURGH OFFICE

The Edison Storage Battery Co. announces the removal of its District Office in Pittsburgh, Pa., to Room 431 Union Arcade Building.

The removal has been made necessary by the tremendous increase in the volume of business handled through this office. The new location provides better facilities and has large office space.

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"DAYLIGHT-SAVING"

After all consideration of artificial light, daylight is the best and it is the standard to which all other light is compared.

For indoor workers the light of the sun is *not* free, but costs the amount necessary to insure its admission and diffusion.

There is a world of difference between the old factory in which the windows were limited in size for fear of lessening the sustaining strength of the wall, and the modern workroom which is frequently *"all* glass."

Lupton Industrial Sash is one of the factors that has made possible these modern light and airy factories, and the illustrations in the new catalog of David Lupton's Sons Co., of Philadelphia, show how it is done and with what effect.

The catalog is identified as No. 10-L. S. S., and a copy may be obtained on application by mentioning this notice.

EMERY WHEEL EXHAUST TYPE PROTECTION HOODS

The Webster & Perks Tool Company, Springfield, Ohio, manufacture several designs of emery wheel exhaust type protection hoods and guards. They have recently issued a very comprehensive catalog on these devices, a copy of which can be obtained by addressing them, and they are going to specialize considerably in the safety features of these products.

LA FRANCE SAFETY DEVICES

The American-La France Fire Engine Company has been manufacturing safety devices for many years at their New York and Philadelphia branches. They have recently expanded their safety line so that all of their branches in our principal cities now carry stocks and can make immediate delivery of all of the many items shown in the new catalog, La France Safety Devices, Edition D. Their experimental department, which carries on the development work, has made up a number of unique and valuable new breathing devices, such as respirators, respirator masks and hoods, pure air helmets, and gas and ammonia filter masks. They also have the La France protection goggles, which have been adopted by many railroads, leading industries, and steel and wire mills. This company, which is over seventy years old, enjoys a reputation for the dependable devices they produce. A copy of their new catalog will be gladly sent to anyone desiring it and your name put on their mailing list for future bulletins.

"TRUMBULL CHEER"

The July issue of the house organ of the Trumbull Electric Manufacturing Company is as usual very readable.

Its editor has not only shown rare selective choice in his extracts from other prints, but has written some original matter of general interest, under the headings of "Revolution and Booze," "Peace Treaties," and "Labor," which are very cleverly handled.

"Circle T." specialties are, of course, described in an attractive manner and on the whole it is a welcome little booklet.

FIRE DOORS AND SHUTTERS

A catalog that tells something and one that at the same time is attractive to look at and interesting to read. is the exception, and these exceptional points are pronounced in the new publication of the Merchant & Evans Co., Philadelphia, entitled "Evans 'Almetl' Fire Doors and Shutters and the Famous 'Star' Ventilators."

This booklet opens with a statement of the claims made for these products and the service and facilities for making good on the claims.

The importance of fire doors and shutters is explained and the attention of architects, contractors, property owners, and city police and safety departments is called to the tests to which these products have been subjected and the Underwriters' Laboratories whose rigid standards they have met.

Extremely interesting illustrations show the wide choice offered in the manner of hanging doors and the provisions made for their automatic closing in case of fire.

There is also a "chamber of horrors" in which may be seen examples of what might happen to inferior doors through long service or through the trial of fire.

A most imposing list of users has the effect of inspiring the stranger's confidence in this old-established concern, and several pages are devoted to the consideration of the "Star" ventilators, Merchant's old method roofing tin, and Merchant's metal Spanish tiles.

We believe that a copy of this catalog may be obtained on application by any of our readers.

CINCINNATI RIVET HEAD CATCHER

Safety from flying rivet heads in boiler work and steel freight car repairs has been effectively secured by the use of a very simple device which is being introduced by the Rivet Cutting Gun Co., Cincinnati, Ohio. This consists of a thin sheet steel shell, leather covered to afford a good grip, which slips over the end of the chisel. The operator in applying the chisel to a rivet head slips the catcher down on the shank of the chisel until its hemispherical end encloses the rivet head. As the head is cut off it is prevented from flying by being caught in this receptacle. The loose fit of the catcher on the shank of the chisel permits of this being turned to allow the head to fall out, whereupon it may be turned back in position through which the operator may see to direct the cutting edge of the chisel against the rivet.

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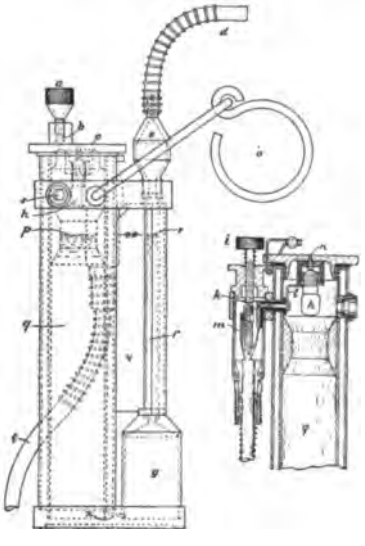
THE IMPROVED BURRELL GAS DETECTOR

The Burrell Gas Detector is an instrument used for the detection of low percentages of explosive gases; i. e., methane, hydrogen, gasoline vapor, natural gas, producer gas, acetylene, etc. Recent improvements on the instrument permit absolutely accurate readings in spite of temperature changes in the surrounding atmosphere—this result being attained after much painstaking experimental work.

The instrument is direct reading and can be successfully handled by any practical observer—no knowledge of chemistry being necessary. In construction the detector is simply a U tube into which a water column is introduced. Into the combustion chamber at the top of the left-hand, or larger side of the U tube—(see illustration) a small sample



Drawing of the Burrell Gas Detector

of the combustible gas is introduced. This gas is burned by the heating of a small platinum wire inside the combustion chamber, and after combustion, the space required by the gas is smaller, permitting the water column to rise on this side of the U tube and to fall on the other side—where a reading scale is attached. A direct reading is then made on this scale indicating the percentage of gas present.

The inventor of this ingenious instrument is Colonel George A. Burrell formerly in charge of the Research Division, Chemical Warfare Section, and it is being handled by the Mine Safety Appliances Company of Pittsburgh, Pa. A large number of Burrell Detectors are in daily use in the gaseous coal mines of this country, also many of these instruments are being used in the industries for the determination of other explosive gases.

ROOFING FACTS WORTH KNOWING

Under the above title, the Standard Paint Co. of Bound Brook, N. J., have issued an attractive book on fire-resistive roofing, and they also have a book on composition shingles bound in a cover representing a shingled roof.

As the wooden shingle is branded as the most industrious of fire breeders, these booklets appeal most strongly to the fire-prevention interests and to all who are concerned with safety to life and property.

Distributed freely while they last.

AMERICOLITE

"Transplanted Sunlight" is what the Americolite Company call their Amercolite lighting fixture. "Americolites" were used to illuminate the main convention hall and other important centers at the 1919 convention of the National Electric Light Association on the Million Dollar Pier at Atlantic City. The equipment was afterwards bought by the Million Dollar Pier Company and remains their permanently. It is very interesting to note the large list of names of recent Americolite installations which is issued with descriptive literature of the Americolite fixture.

LUNGMOTOR COMPANY

The Lungmotor Company, 711 Boylston Street, Boston, Mass., United States distributors of the Lungmotor, announce the appointment of Max Jacabson as their representative for Greater New York and New Jersey. Offices have been selected at 25 West 42nd street, New York City.

WILLSON SAFETY GOGGLES

A catalogue fully describing Willson safety goggles, including safety-flange goggles and other protective styles for industrial requirements, has been recently issued by T. A. Willson & Co., Inc., Reading, Pa.

This twelve-page catalogue is profusely illustrated and tells in detail the principal feature of the different style goggles. It also mentions style A-4 safety goggle, which is made especially for women industrial workers, whose work brings them in contact with dust and small flying particles.

Copies may be obtained by addressing the manufacturer.

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THE AMERICAN SOCIETY OF SAFETY ENGINEERS

The committee in charge of the reorganization of the American Society of Safety Engineers report having held a number of meetings and have progressed to a point where the objects of the society and the qualifications for membership therein have assumed the following form:

ARTICLE II.

OBJECT

The object of the Society is to promote the Arts and Sciences connected with Engineering in its relation to Safety for Life and property. The achievement of this purpose shall be through the holding of meetings for the reading and discussion of professional papers and for social intercourse; the careful consideration and determination of technical Safety Engineering problems, including the adoption and application of safety standards; the publication and distribution of its papers, discussions and determinations; the maintenance of a library devoted to its particular requirements, and helpful co-operation with official and other bodies.

ARTICLE IV.

MEMBERSHIP.

Certain engineering attainments or qualifications related or directed to Safety for Life and Property shall be a requisite of eligibility for membership.

The corporate members of this Society shall be designated as Members and Associate Members. They shall have the right to vote and hold office. There may also be connected with it, Honorary Members, Fellows and Juniors who shall be entitled to all the privileges of the Society, except the right to vote and hold office therein, although Honorary Members and Fellows elected from the corporate members shall retain those rights.

A Member shall be a graduate of any recognized technical engineering college or school who shall have been engaged in the practice of Safety Engineering for at least two years; or any person who has been in responsible charge of important work in that line for at least three years. The performance of the duties of a Professor of Engineering in a technical school of recognized standing shall be considered as equivalent to an equal number of years of actual practice.

An Associate Member shall be a person so connected with some phase of promoting Safety for Life and Property that the Executive Board may consider him qualified to co-operate with Safety-Engineers. The number of Associate Members shall not exceed 35 per cent of the total corporate membership.

An Honorary Member shall be chosen only from persons of acknowledged professional eminence in Safety Engineering. The number of Honorary Members shall not exceed 10 at any one time, and not more than two shall be elected in any one year.

Fellows shall be persons chosen with their consent from the corporate members because of exceptional accomplishment in Safety Engineering, or other persons who shall, in the opinion of the Executive Board, merit this degree.

A Junior shall have such experience as will enable him to fill a subordinate position in Safety Engineering. He shall not be less than 18 years of age, and his connection with the Society shall cease when he becomes 32 years of age, unless he be previously transferred to another grade.

Nothing in this Constitution shall act to debar any present members from continuing in the class to which they are now assigned.

The rights and privileges of every member shall be personal to himself, and shall not be transferable or transmissable by his own act or by operation of law.

The committee being anxious to have an unbiased and yet authoritative opinion on the need for such a society invited the views of the Bureau of Standards of the U. S. Dept. of Commerce, with the following response:

DEPARTMENT OF COMMERCE,
Bureau of Standards, Washington, D. C. July 22, 1919.
Mr. H. W. Mowery,
50 Church St., New York.

Dear Sir:

In replying to your letter concerning the American Society of Safety Engineers, it seems to me that there is an important field of work which could be covered by such a society if organized on a national basis, and having the adherence of the men engaged in safety engineering. Such a society would bring these men together for the exchange of ideas, and would be valuable to them in thus learning the experience of others to add to their own fund of information.

* * *

I am assuming that the membership of the society would be made up principally of the following groups:

(a) Engineers concerned with safety and inspection work for insurance companies;

(b) Engineers concerned with safety and inspection work for the various states and municipalities;

(c) Engineers concerned with safety and inspection work for manufacturing, mining, utility and other industrial corporations;

(d) Engineers concerned with the manufacture and supply of safety devices and materials;

(e) Engineers interested in and qualified for safety work, but not included in the above, such as consulting engineers, and those retained by safety organizations.

* * *

Some of the activities which I think the Society should engage in are as follows:

(a) A study of the engineering features and details of safeguards.

(b) Co-operation with state commissions and other official bodies in accident and regulatory work.

(c) Consideration of safety codes and regulations.

(d) Co-operation with other engineers to keep safety features more prominent in carrying out their lines of engineering work.

(e) Cultivation of the field of safety engineering as by encouraging courses in this subject in colleges and technical schools and bringing it to the attention of other bodies in many ways.

The objects of the society seem to be very well stated in the proposed constitution.

* * *

I cannot see that an organization covering this field will have any reason to get into conflict with agencies already organized and active. There seems to me to be a field here which is not at present adequately covered, and which is of sufficient importance and will be of sufficient interest to a large number of men to make the proposed organization a success if sufficient energy is applied in organizing it. Undoubtedly it could do a great deal of good and become to some extent an authoritative body in its chosen field.

With best wishes, and hoping that success may crown your efforts in this movement, I am very truly yours,

.....
Chief, Safety Section.

The committee has assurances that the great body of safety engineers and those affiliated with them wish to be identified with a society having the objects stated above, but it is desired that when the plan of reorganization is submitted, it shall be accompanied with actual evidence of approval.

Therefore, the committee asks that you immediately send your application for membership under such a plan to the American Society of Safety Engineers, Room 1465, 50 Church St., New York, so that the subject can have full consideration at a special meeting called for that purpose.

In order to have your application considered it must reach the committee not later than Sept. 8, but do not wait until that time to send it—"Do it now."

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UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

ARMORED CABLE—Thomas & Betts Co., Submittor, 63 Vesey St., New York, N. Y.

AUTOMATIC SWITCHES—PRESSURE OPERATED TYPE—Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

AUTO-STARTERS—Electric Controller & Mfg. Co., The Mfr., Cleveland, Ohio.

BELT FASTENERS—Crescent Belt Fastener Co., Mfr., 381 Fourth Ave., New York, N. Y.

CABINETS AND CUTOUT BOXES—SHEET METAL—Large-Dail Mfg. Co., Mfr., 114 N. 13th St., Philadelphia, Pa.

CABINETS AND CUTOUT BOXES—SHEET METAL—Massachusetts Electric Co., Mfr., 18 Grafton St., Worcester, Mass.

CABINETS AND CUTOUT BOXES—SHEET METAL TYPE—Metropolitan Engineering Co., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

CARTRIDGE FUSES—RENEWABLE TYPE—Chicago Fuse Mfg. Co., Mfr., 1014 W. Congress St., Chicago, Ill.

CARTRIDGE FUSES—Commercial Enclosed Fuse Co., Mfr., 1317 Willow ave., Hoboken, N. J.

CARTRIDGE FUSES—Electric Fuseguard Co., Inc., Mfr., 60 Shipman St., Newark, N. J.

CARTRIDGE FUSES—RENEWABLE TYPE—Federal Sign System (Electric), Mfr., Lake and Desplaines Sts., Chicago, Ill.

CARTRIDGE FUSES, RENEWABLE TYPE—Trico Fuse & Mfg. Co., Mfr., 10th St. and Cold Spring Ave., Milwaukee, Wis.

CLASS A SHINGLE ROOF COVERINGS—Truscon Laboratories, The, Mfr., Detroit, Mich.

CLASS B PREPARED ROOF COVERING—Johns Manville Co., H. W., Mfr., Madison Ave. and 41st St., New York, N. Y.

CLASS B SHINGLE ROOF COVERINGS—Truscon Laboratories, The, Mfr., Detroit, Mich.

CLASS C PREPARED ROOF COVERINGS—Ford Roofing Products Co., Mfr., Vandalia, Ill.

COMBINATION SERVICE ENTRANCE BOX—Electrical Development Co., Mfr., 821 Union St., New Orleans, La.

CONDUIT BOXES—Appleton Electric Co., Mfr., 212-14 N. Jefferson St., Chicago, Ill.

CONDUIT BOXES—Cameron Overbagh & Co., Mfr., 231 N. Wells St., Chicago, Ill.

CONDUIT BOXES—Thomas & Betts Co., Mfr., 63 Vesey St., New York, N. Y.

ELECTRO-MECHANICAL GONGS—Ostrander & Co., W. R., Mfr., 371 Broadway, New York, N. Y.

ELECTRO-MECHANICAL GONGS—Stanley & Patterson, Mfr., 23 Murray St., New York, N. Y.

ELEVATOR CONTROL APPLIANCES—Elevator Locks Co., Mfr., Peoria, Ill.

ELEVATOR CONTROL APPLIANCE—Shur-loc Elevator Safety Co., Inc., Mfr., 127 White St., New York, N. Y.

ENCLOSED SWITCHES—Trumbull Electric Mfg. Co., The, Mfr., Plainville, Conn.

FITTINGS FOR CONDUIT BOXES—COVERS—Cameron Overbagh & Co., Mfr., 231 N. Wells St., Chicago, Ill.

FIXTURE FITTINGS—Cutter Co., George, Mfr., South Bend, Ind.

FIXTURES—Cosby Electric & Machine Co., R. R., Mfr., 1705 E. Broad St., Richmond, Va.

FLOOR OUTLET BOXES—Thomas & Betts Co., Mfr., 63 Vesey St., New York, N. Y.

FUSELESS ATTACHMENT PLUGS—Chelten Electric Co., The, Mfr., 4859 Stenton Ave., Philadelphia, Pa.

HAZARDOUS LIQUID VALVES—Belknap Mfg. Co., The, Mfr., 149 Water St., Bridgeport, Conn.

HAZARDOUS LIQUID VALVES—Hays Mfg. Co., Mfr., 12th and Liberty Sts., Erie, Pa.

HAZARDOUS LIQUID VALVES—Commonwealth Brass Corp., Mfr., Detroit, Mich.

HOLLOW METAL FIRE WINDOW FRAMES—Lawton-Stephens Co., Inc., Mfr., 1270 Broadway, New York, N. Y.

LAMP ADAFTERS—Pass & Seymour, Inc., Mfr., Solvay, N. Y.

LAMP GUARDS—Flexible Steel Lacing Co., 522 S. Clinton St., Chicago, Ill.

LIGHTNING RODS—Thompson Lightning Rod Co., Inc., The Geo. E., Mfr., Owatonna, Minn.

MEDIUM BASE RECEPTACLES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

MEDIUM BASE SOCKETS—Despard & Gordon Co., Mfr., Chicago, Ill.

MEDIUM BASE SOCKETS—Union Electric Co., Mfr., Trenton, N. J.

METAL RACEWAY FITTINGS—Appleton Electric Co., Mfr., 218-30 N. Jefferson St., Chicago, Ill.

MINIATURE MOTION PICTURE MACHINE—American Foundry Co., Inc., Mfr., 634 S. 11th St., Newark, N. J.

MINIATURE MOTION PICTURE MACHINE—Pathéscope Co. of America, The, Mfr., 33-35 W. 42nd St., New York, N. Y.

OIL-BREAK SWITCHES—General Electric Co., Mfr., Schenectady, N. Y.

OUTLET BUSHINGS AND FITTINGS—Thomas & Betts Co., Mfr., 63 Vesey St., New York, N. Y.

OUTLET PLATES—Cameron Overbagh & Co., Mfr., 231 N. Wells St., Chicago, Ill.

PANELBOARDS—Large-Dail Mfg. Co., Mfr., 114 N. 13th St., Philadelphia, Pa.

PANELBOARDS—Massachusetts Electric Co., Mfr., 18 Grafton St., Worcester, Mass.

PENDANT SWITCHES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

PLUG FUSE CUTOUT BASES—Metropolitan Engineering Co., Mfr., 1250 Atlantic Ave., Brooklyn, N. Y.

PLUG FUSES, RENEWABLE TYPE—Economy Fuse and Mfg. Co., Mfr., Kinzie and Orleans Sts., Chicago, Ill.

PORTABLE RECORDERS AND KEY STATIONS—Hardinge Bros. of Canada, Ltd., Mfr., 50 Front St., E., Toronto, Ont.

PUSH AND ROTARY FLUSH SWITCHES—Hart & Hegeman Mfg. Co., The, Mfr., Hartford, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—V. V. Fittings Co., Mfr., 1910 N. 6th St., Philadelphia, Pa.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Gordon Electric & Mfg. Co., Mfr., Waterville, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Hart Mfg. Co., The, Mfr., Hartford, Conn.

REDUCING VALVES, HIGH-PRESSURE GAS—Wm. Crowell Co., Submittor, 775-79 Communipaw Ave., Jersey City, N. J.

REDUCING VALVES, HIGH-PRESSURE GAS—General Welding & Equipment Co., Submittor, 107 Massachusetts Ave., Boston, Mass.

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SAFETY ENGINEERING

Vol. 38 SEPTEMBER, 1919 No. 3

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Dedication of Mines Million Dollar Laboratories in City of Pittsburgh

THE new laboratories of the Interior Department's Bureau of Mines in Pittsburgh, costing more than a million dollars, are to be dedicated on September 29 and 30 and October 1 with appropriate ceremonies, in which the mining and metallurgical industries of the country are to take part. The program for the three days has been arranged by the Bureau of Mines in co-operation with the Pittsburgh Chamber of Commerce.

One of the biggest features will be the Nation-wide first-aid and mine-rescue contest to be held during the last two days. Already nearly 100 teams from the coal and metal mining companies throughout the country have entered the lists, and more are expected by the time the entries close.

On October 1 there will be a holiday for the miners of the Pittsburgh district, and thousands will attend this National meet and witness the awarding of the prizes to the winners.

MEDALS, TROPHIES, DIPLOMAS

In addition to the usual prizes, the Joseph A. Holmes Safety Association, an organization created in 1916, in honor of the memory of the first director, for the purpose of giving recognition to persons who had performed meritorious and heroic deeds in the saving of human life in the mining and metallurgical industries, or who had developed some safety appliance to further the saving of life in those industries, will make its first awards. Dr. Van H. Manning, president of the association, will announce the list of recipients of diplomas and medals, and will recite the deeds for which they are presented. The committee on awards has recommended that 12 gold medals be awarded, all for heroic deeds performed by miners in coal and metal mines in efforts to save the lives of fellow workmen. In several instances where men lost their lives in endeavoring to save others, the medals will be awarded to their nearest living relative. It is the intention that this organization serve the mining industry in the same manner as the Carnegie Hero Commission attempts to serve industry generally.

DR. MANNING ON ACCIDENT CONDITIONS

Speaking of the accident conditions generally in the mining industries and of the outlook, Dr. Van H. Manning, director of the Bureau of Mines, says:

"I am often asked, 'What has the Bureau of Mines accomplished in the saving of human life in the mines?'

"It is difficult to say that so many miners might not have been killed if it were not for the Bureau of Mines—there are so many varying factors involved. I may say, however, that if you consider the prevailing average death rate in the mines for a period of years before the Federal Government took up this work, and compare it with the average fatality

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rate since the bureau was created, you will find that 5,000 fewer miners have been killed. In other words, had the old fatality rate been maintained through the last few years, 5,000 more men would have lost their lives.

FIVE THOUSAND LIVES SAVED!

"I am of the opinion that the statement of 5,000 lives saved is a conservative one, for it must be remembered that the situation was gradually becoming worse in the mines, and who knows that there might not have been 7,000 or 8,000 lives lost? We also have to take into consideration that, thanks to the many improvements in life saving methods and the greater understandings of the causes of accidents, the tide has definitely turned, and that this saving of 5,000 human beings within a few years will be accentuated and increased as the years roll on until we can show several times 5,000 lives saved.

"Whatever statisticians attempt to make out of these figures, however they may endeavor to twist them, it is indeed a glorious record of human progress. Five thousand lives saved! Perhaps 2,000 fewer widows! At least 3,000 children who still have fathers.

"Take away all the other manifold duties of the Bureau of Mines and this one accomplishment is worthy of all its cost to the Government since its establishment and for years to come. And when I referred to this as an accomplishment, I do not mean that the Bureau of Mines deserves all of the credit. It was, however, the agency that picked up the isolated, sporadic efforts of a few well meaning men and companies and welded them into a great National move-

The New Laboratories of the Bureau of Mines

ment for greater safety in the mines. It is true that it at once gained the cooperation of the miners, the mine operators, the State mine inspectors and others, and without these the Bureau of Mines would have been almost helpless.

ORIGIN OF A GREAT WORLD SLOGAN

"It was in 1911 that the bureau held under its auspices a great National first-aid and mine-rescue meet in Pittsburgh, Pa., which was attended by 22,000 miners. The slogan of that meet was 'Safety First,' and that was the time that the slogan, since internationally famous, first became a National battle cry for this humanitarian movement. I understand that a steel company had used the slogan locally before that, but to all intents and purposes the Bureau of Mines was responsible for making it a world slogan.

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"Not only was 'Safety First' immediately adopted by the mining companies, as you will see it posted about hundreds of mines and also on their equipment, but it was also taken up by the railroads and by industrial plants of the country until it became a National by-word.

Interior of Training Room of the Bureau of Mines, where men are taught to use the Oxygen Mine Rescue Apparatus

Safety organizations appeared everywhere; committees of the men were formed in the mines and shops, and determined campaigns were inaugurated to reduce the number of deaths and injuries in the industries. In some of the big establishments the committees printed little papers for the men, giving the progress of the life-saving work and pointing out accidents that perhaps could have been avoided. Safety inspectors and committees were chosen; the railroads built up elaborate safety organizations, and divisions vied with one another as to which could produce the cleanest records. There was a spirited rivalry among these committees, and the records of the different establishments began to show results in lives saved and men saved from suffering. In quite a number of mills and factories and railroads there was a reduction in the fatalities of more than 50 per cent. Further improvement was slower, but the original gains were made and added to.

SPREAD OF THE SAFETY MOVEMENT

"Just how many thousands of lives were saved may never be known, for there are no statistics that adequately cover industrial accidents, but we do know that the Bureau of Mines and its associated agencies started a movement that spread not only throughout the United States, but also reached the other countries of the world with an equally good effect. And it all started with the

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modest mine safety meet we held in Pittsburgh in 1911.

"Since that time, the bureau has gone on its way, improving its methods, interesting the miner in his own safety and that of his fellow man; doing what it could to point out to the owners of the mines the dangerous places that could be avoided, and making recommendations as the result of its experiments looking toward still greater safety.

"Today the Bureau of Mines maintains in every mining field of the country a mine rescue car fully equipped with modern life saving apparatus, that responds to disasters and assists in the rescue work, in the meanwhile visiting the mines in its district and giving the miners training in both mine rescue and first aid to the injured. As a result, there are several thousand miners throughout the country who are expert in the use of the oxygen mine rescue apparatus and familiar with the most modern methods of life saving. Besides, more than 50,000 miners understand first-aid-to-the-injured work as well as regular hospital corps. All of these men have been trained by the Bureau of Mines.

FEWER DISASTERS

"Happily, great mine disasters have been becoming fewer and fewer as the men come to a better understanding of the causes. Nevertheless, they do happen, and one thing that the bureau has preached is that upon such a visitation there shall be a more orderly and systematic method of rescue work, for it has been demonstrated that life can be saved in devious ways. The bureau has endeavored to tell the miners that in a great catastrophe it is often better for entombed miners to barricade themselves in, keeping the poisonous gases out of their working place and waiting for relief. In this manner 42 men entombed in a mine for 4 days were recently rescued, the men even being able to walk out of the mine.

"We are now hopeful that this coming Nation-wide first-aid and mine-rescue week in Pittsburgh will give the safety movement another such impetus as the meet in 1911. If its influence is but one fraction of the former meet, the bureau will be amply repaid for initiating this movement.

NOT CONTENT WITH PROGRESS MADE

"As far as the mining industry is concerned, we are not content to rest on the progress made. There are now more than a million miners in the United States, and each year more than 3,000 are killed in accidents and a quarter of a million injured. Taking the cold, business calculation of the State compensation commission, and eliminating the suffering and sorrow of 3,000 killed each year, the economic loss from these fatalities alone is $12,000,000 a year, for these commissions are paying an average of $4,000 for every life lost. This is a terrible toll for one industry to pay each year in providing the coal that furnishes the power of the Nation and warms the homes of the people. It is hard for us to realize that, out of every mining camp of 1,000 men, three of them are sure to lose their lives before the next year is out.

"Mining will always be an extra hazardous business; there will always be dangers inherent to the industry that will ever take a death toll and beyond which it will be impossible to reduce the death rate.

"But the question is, 'Have we reached that irreducible minimum?' No, I think not. It is my belief that we can cut down the present fatality rates fully one-half; that we can save each year 1,500 of the 3,000 killed every 12 months. Isn't such a goal worth striving for? A prize of 1,500 human beings saved to life, happiness, their families, each year!

DANGERS OF COAL DUST

"This may seem like one of those ideals impossible to attain, but so did the saving of 5,000 lives already accomplished through similar efforts. Nevertheless, that is our goal, and today we see more definitely its attainment than the progress already made when we started this work. The causes of these fatal accidents are now much better known than heretofore. Operators and miners are giving much more thought to the dangers of the mines, and the wide-awake among them

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have installed more modern safety devices. The industry is not now groping in the dark on some of those causes that were more or less mysterious some years ago, such as the dangers from coal dust. Through the experimental mine of the bureau, mining men and miners both have a keener understanding of the dangers of coal dust, and they have also learned how to care for this menace that has cost so many lives.

"CUT THE MINE FATALITIES IN HALF"

"In the mining industry at least a human life is much more valuable than ever before, and I believe that can be said of all the industries, especially those of the United States. The recent world holocaust, in which 7,000,000 men made the supreme sacrifice, would seem to belie my statement; nevertheless, it is true, as seen in the great advances in safety work, the millions of dollars spent in safety devices and the humanitarian work of the different State compensation commissions. The day of the ambulance chaser and those ghouls that preyed upon the widow beset with grief over the loss of her husband have happily passed away. The State now steps in and sees that the widow and the orphan are protected, and that alone is worth all the fight that we have endeavored to make. I do not say that the Bureau of Mines is responsible for these State compensations, but I do know that these commissions came after the mining industry started its great human saving drive, and that the disclosures of the conditions in mining furnished the States with facts that favored the establishment of these commissions.

"Cut the mine fatalities in half."

DEDICATORY CEREMONIES

The dedication ceremonies promise to bring to Pittsburgh for three days the most prominent mining and metallurgical men of the Nation, not alone interested in the "Safety First" movement, but also those connected with the allied industries that use the products of the mines.

The Bureau of Mines, in co-operation with the Pittsburgh Chamber of Commerce, has already completed an elaborate program of events which includes the presence of Government and State officials, besides the leading men of mining thought in the country. The ceremonies proper will open on Monday morning, September 29. The evening before (Sunday) committees will be at the leading hotels to receive guests. On Monday morning the new laboratories at 4800 Forbes street will be open for inspection, and at 10.30 o'clock the dedicatory ceremonies will be held on the lawn in the rear of the laboratories, with Dr. Van H. Manning, director of the bureau, presiding. After invocation by Dr. S. B. McCormick, chancellor of the University of Pittsburgh, an address of welcome will be delivered by the Hon. E. V. Babcock, mayor of Pittsburgh. Response will be made by the Hon. Franklin K. Lane, Secretary of the Interior. Addresses will follow by Horace B. Winchell, president of the American Institute of Mining & Electrical Engineers; John L. Lewis, acting president of the United Mine Workers of America, and the Hon. William C. Sproul, governor of Pennsylvania. Then the formal ceremony of handing over the keys of the building by Secretary Lane to Director Manning will take place.

PRE-ARRANGED COAL DUST EXPLOSION

After luncheon in the Bureau of Mines buildings, the guests will board special trains on the B. & O. to the experimental mine of the Bureau of Mines in Bruceton, Pa., 14 miles from Pittsburgh. Upon arrival there a pre-arranged explosion of coal dust will take place in the experimental mine as a demonstration to the visitors, and after that an inspection of the mine and the explosives testing plant will be made, the guests returning to the city at 6 p. m. At 8 p. m. a general meeting will be held in Carnegie Music Hall under the auspices of the Pittsburgh Chamber of Commerce, with an address by Secretary Lane and an organ recital by Dr. Charles Heinroth. A moving picture prepared by the National Coal Association, "The Story of Coal," will be given a first presentation.

TUESDAY AND WEDNESDAY EVENTS

On Tuesday, September 30, the new laboratories will be open the entire day

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for inspection by the guests, and at 2 p. m. the elimination contests in the National Safety First-Aid and Mine-Rescue Meet will be held at Forbes Field, also the awarding of the State championships. At 5 p. m., at Forbes Field, there will be a demonstration of the explosibility of coal dust, and at 8 p. m. the Chamber of Commerce will present a pageant typifying the spirit of the mining industry, with music by the band of the Carnegie Institute of Technology.

On Wednesday, October 1, at 9 a. m., a final mine-rescue contest will take place among the 10 successful teams of the previous day at Forbes Field, with a presentation of the National cups and prizes. At 2 p. m. announcements of the J. A. Holmes Safety Association will be made by Dr. Van H. Manning. At 2.30 will be held the final first-aid contest participated in by the 20 best teams of the previous day for the gold cups and prizes. At 5 there will be a demonstration of a coal dust explosion at Forbes Field, the events closing with a smoker in the Chamber of Commerce, when the prizes will be awarded and speeches made.

HONORARY COMMITTEE

The honorary committee in charge of the dedication of the Pittsburgh station: George S. Oliver, president, Pittsburgh Chamber of Commerce; John F. Herron, president, City Council of Pittsburgh; Harry N. Taylor, president, National Coal Operators' Association; John L. Lewis, acting president, United Mine Workers of America; Horace B. Winchell, president, American Institute of Mining & Electrical Engineers; the Hon. Franklin K. Lane, secretary of the Interior; Dr. Van H. Manning, director, Bureau of Mines; Dr. S. B. McCormick, chancellor of the University of Pittsburgh; Dr. Arthur A. Hammerschlag, president of the Carnegie Institute of Technology; Dr. S. W. Stratton, director, Bureau of Standards; Dr. R. F. Bacon, director, Mellon Institute; Seward E. Button, chief, Department of Mines, State of Pennsylvania; Dr. D. Van Schaack, president of the National Safety Council; T. A. O'Donnel, president, American Petroleum Institute; Mortimer E. Cooley, president, American Society of Mechanical Engineers; Fayette S. Curtis, president, American Society of Civil Engineers; J. A. Capp, president, American Society of Testing Materials; Dr. William H. Nichols, president, American Chemical Society; Calvert Townley, president, American Society Electrical Engineers; G. H. Neilson, president, Engineers Society of Western Pennsylvania; Dr. W. D. Bancroft, president, American Electro-Chemical Society; R. T. Stull, president, American Ceramics Society; E. N. Zern, president, Coal Mining Institute of America; James R. Angell, chairman, National Research Council.

PRIZES AND TROPHIES

Among the prizes and trophies to be competed for at the first-aid and mine-rescue contest are:

1. New National Safety Council silver cup to winner of National first-aid contest.

2. Silver challenge cup to winner of National mine-rescue contest.

Gold medals of the National Safety Council to the winning team members of mine-rescue and first-aid contests.

Silver medals of the National Safety Council to the second best team members of mine-rescue and first-aid contests.

Bronze medals of the National Safety Council to the third best team members of mine-rescue and first-aid contests.

Bronze medals of the American Red Cross to each member of the winning first-aid team.

Prize certificates of the American Red Cross to each member of the second and third best first-aid teams.

Special prizes to the highest rating teams in the first day's mine-rescue and first-aid contests from each State represented.

Banners to each team competing in either the mine-rescue or first-aid contests (provided that only one banner will be given to a team participating in both the first-aid and mine-rescue contests).

Souvenir watch fobs to all members of first-aid and mine-rescue teams competing.

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Eighth Annual Safety Congress of the National Safety Council

Cleveland, Ohio, October 1, 2, 3 and 4

The Week in Cleveland—Safety and Hospitality

WHEN the Eighth Annual Safety Congress of the National Safety Council and the Safety Exposition under the joint auspices of the National Safety Council and the Safety Institute of America are held in Cleveland, during the week from September 29 to October 4, not only the workers for safety but also every resident of Cleveland and the strangers within its gates will be impressed with the fact that something is doing.

The committees in charge of the safety week demonstrations have been meeting regularly at a weekly luncheon at the Cleveland Chamber of Commerce, and the individual work has been steady between times.

Oscar MacNab, who occupied the chair at the conferences, has arranged that Bishop Farley, Dr. Spaulding and Dr. Yawberg should distribute 175,000 window cards and letters among the city, country and suburban schools, and that F. H. Caley should superintend the distribution of 40,000 automobile stickers given by the Cleveland Automobile Club.

Thomas Stannion and J. H. Farrell have arranged a picture show rally in the Central Armory building and will distribute 175,000 tickets to school children.

Boy Scouts, under the leadership of John K. Doan, will act as pages at the congress and as ushers at the show, distribute stickers for automobiles and assist in warning pedestrians during the week.

The street car companies have agreed to post signs on all their cars and have contributed safety buttons for policemen, motormen and conductors.

The churches will receive data relating to safety, which the ministers will be requested to call to the attention of their congregations.

Director Waite has promised special police protection for delegates and a daily police drill at noon.

Extraordinary publicity has been given by page announcements in the Cleveland dailies, and the entertainment features provide for a dance on the opening night, sight-seeing tours for the ladies, a banquet and a smoker.

Buell W. Nutt is entrusted with the welcoming of the visitors at stations and their guidance by street zone cards.

In addition to the police drills, there will be parades of the police and fire departments, school military organizations, Boy Scouts, industrial bands, etc.

All managers of industrial plants will receive invitations with special reference to sessions likely to be of interest to them.

An accident clock will be erected in a conspicuous location, statistics of current accidents will be published, all wagons and trucks will be furnished with banners, circulars will be distributed in bulk to department stores, and a booklet on safety week will be given to managers, ministers, school principals and others.

Dr. Suhrie of the Normal School is arranging a pantomime play to be given by children in connection with Dr.

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Payne's talk on Saturday afternoon in the Hotel Statler.

The long list of local safety activities is almost endless.

Every class of citizen will be reached in some way; even the stay-at-home housewife will receive the safety message on the top of her milk bottle, and the traveling man will read a safety slogan each day on the menu of his hotel.

The man who walks the streets will have stereopticon shows to look at, and 5,000 posters and 100,000 tickets will be used to induce the attendance of the industrial worker.

The whole city will be given over to two thoughts—Safety and Hospitality.

Program of Eighth Annual Safety Congress

Wednesday, October 1—10 A. M.

Ball Room, Mezzanine Floor.

ANNUAL MEETING OF MEMBERS. Chairman, David Van Schaack, President, National Safety Council.

Order of Business:

Invocation by Ferdinand Q. Blanchard, D.D., President, Federated Churches of Cleveland.

Address of Welcome by Mayor Harry L. Davis of Cleveland.

Response by President.

Roll Call, or other ascertainment of members present.

President's Address.

Reading and disposal of unapproved minutes.

Reports of Officers and Committees:

- General Manager.
- Committee on Business and Administration.
- Committee on Internal Development.
- Committee on Public Co-operation.
- Committee on Service to Members.
- Committee on Education.
- Resolutions Committee.
- Nominating Committee.

Election of Directors.

Unfinished Business.

New Business.

[Every member who cannot be present should designate one of his representatives in attendance to cast his entire vote.]

Wednesday, October 1—2 P. M.

Ball Room, Mezzanine Floor.

GENERAL SESSION: EMPLOYES' REPRESENTATION. Chairman, Arthur H. Young, Manager, Industrial Relations, International Harvester Company, Chicago.

Co-operation and Industrial Progress.—Cyrus McCormick, Jr., Works Manager, International Harvester Company, Chicago.

Experience of Wm. Demuth & Company in Industrial Democracy.—F. L. Feurbach, Factory Manager, Wm. Demuth & Company, Richmond Hill, N. Y.

Practical Aspects of Employes' Representation.—E. B. Tolsted, Independence Bureau, Philadelphia, Pa.

Employes' Representation from the Standpoint of Organized Labor.

Labor Management and Collective Bargaining.—W. M. Leiserson.

Discussion.

[The Chairman will open the discussion of the addresses given at this session.]

Directors' Meeting, 5 p. m., Private Dining Room, No. 3 Mezzanine Floor.

Reception and Informal Dance, 9 p. m., Ball Room, Mezzanine Floor.

Thursday, October 2—8 A. M.

Ball Room, Mezzanine Floor.

GENERAL ROUND-TABLE. Chairman, Thomas Stanion, Aluminum Castings Company, Cleveland, Ohio.

Is Industrial Death Necessary?—Dr. Lucian W. Chaney, United States Bureau of Labor Statistics, Washington, D. C.

Supervision as a Factor in Accident Prevention.—L. A. DeBlois, E. I. du Pont de Nemours & Company, Wilmington, Del.

Free-For-All Discussion.

[This is a good old-fashioned Round-Table of the sort which has always been a feature of our Annual Congresses—the kind where everybody wants to talk at once and the Chairman cuts off your head after three minutes. What is the principal factor in Safety—engineering revision, supervision, or education? Dr. Chaney says one thing; Mr. DeBlois says another; what do you say? To avoid conflict with other sessions we had to schedule this meeting for 8 a. m., knowing that every real safety man in America would come anyway, at whatever hour of the day or night. If you're a real Safety Scout, get out at eight o'clock and show your colors.]

Thursday, October 2—9:30 A. M.

South Foyer, Mezzanine Floor.

THE A, B, C SESSION. Chairman, Philip Stremmel, Superintendent, Hot Mills, National Enameling & Stamping Company, Granite City, Ill.

The Essentials of a Safety Organization.—C. B. Hayward, District Safety Manager, Liberty Mutual Insurance Company, Philadelphia, Pa. Discussion.

The Foreman—the Determining Factor.—F. E. Morris, Regional Field Secretary, National Safety Council. Discussion.

Methods of Promoting Safety Education in

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a Plant.—W. R. Rasmussen, Regional Field Secretary, National Safety Council. Discussion.

Workmen's Inspection Committees.—John A. Oartel, Director of Safety, Carnegie Steel Company, Pittsburgh, Pa. Discussion.

Fundamental Principles of Safeguarding—S. J. Williams, Secretary and Chief Engineer, National Safety Council. Discussion.

General Discussion, Questions and Answers.

[This session has been arranged primarily for the benefit of the younger safety engineers and others who want to hear "the old, old story" of HOW TO PUT SAFETY ACROSS.]

Thursday, October 2—9:30 A. M.

Private Dining Room No. 1, Mezzanine Floor.

AUTOMOTIVE SECTION. Chairman, James J. Lynch, Chevrolet Motor Company, New York City. Vice-Chairman, R. A. Shaw, Department of Safety and Factory Hygiene, Ford Motor Company, Detroit, Mich. Secretary, A. R. Howe, Safety Engineer, Standard Parts Company, Cleveland, Ohio.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.

Punch Press Operations.—A. L. Kaems, Deputy, Industrial Commission of Wisconsin, Madison, Wis. Discussion.

Electrical Equipment, Its Installation and Guarding.—L. C. Kahle, Chief Engineer, Independent Lamp Wire Company, Inc., New York City. Discussion.

Our Method of Safety Education.—R. A. Shaw, Department of Safety and Factory Hygiene, Ford Motor Company, Detroit, Mich. Discussion.

General Discussion, Questions and Answers.

Thursday, October 2—9:30 A. M.

Parlor C, Second Floor.

CEMENT SECTION. Chairman, H. G. Jacobson, Manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, Chicago.

FIRST SESSION

Physical Examination, First Aid, and Care of the Injured at Cement Plants.—Dr. Charles E. Coleman, Plant Physician, Marquette Cement Manufacturing Company and Lehigh Portland Cement Company, Oglesby, Ill. Discussion.

Sanitation in Cement Plants.—B. L. McKay, Safety and Employment Manager, Universal Portland Cement Company, Buffington, Ind. Discussion.

Educating Cement Plant Employes in Safety.—J. C. Josse, Superintendent, Continental Portland Cement Co., St. Louis, Mo. Discussion.

General Discussion, Questions and Answers.

Thursday, October 2—9:30 A. M.

Parlor D, Second Floor.

CHEMICAL SECTION. Chairman, E. H. Fiesinger, Safety Engineer, Solvay Process Company, Syracuse, N. Y. Vice-Chairman, H. C. Slade Safety Engineer, Hooker Electro-Chemical Company, Niagara Falls, N. Y. Secretary, S. M. Schott, Morgan & Wright, Detroit, Mich.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.

Supervision of the Chemical Industry from the Point of View of Accidents and Occupational Diseases.—Dr. Alice Hamilton, United States Bureau of Labor Statistics, Washington, D. C. Discussion.

Lead Poisoning and Its Prevention.—C. P. Tolman, Chairman, Manufacturing Committee, National Lead Company, New York City. Discussion.

Dangers in the Manufacture of Dyes.—Dr. L. C. Cone, National Aniline & Chemical Company, Buffalo, New York. Discussion.

General Discussion, Questions and Answers.

Thursday, October 2—9:30 A. M.

Private Dining Room No. 3, Mezzanine Floor.

CONSTRUCTION SECTION. Chairman, L. D. Woedtke, Director of Safety, Fred T. Ley and Company, Springfield, Mass. Vice-Chairman, W. J. Lynch, Assistant to Vice-President, Thompson-Starrett Company, Chicago. Secretary, Edward W. Bush, Civil Engineer, Aetna Casualty & Surety Company, Hartford, Conn.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.

Is Accident Prevention in Construction a Source of Profit or a Hobby?—F. L. Hurlbutt, E. I. du Pont de Nemours & Company, Wilmington, Del. Discussion.

How the Small Contractor Can Reduce Accidents.—Geo. A. Rutherford, Geo. A. Rutherford Company, Cleveland, Ohio. Discussion.

Protecting the Public Against Accidents on New Buildings.—C. M. Talbert, Director, Department of Streets and Sewers, St. Louis. Discussion.

General Discussion, Questions and Answers.

Thursday, October 2—9:30 A. M.

Electrical League Dining Room, Fourteenth Floor.

ELECTRIC RAILWAY SECTION. Chairman, H. B. Adams, Safety Supervisor, Aurora, Elgin & Chicago Railway Company, Aurora, Ill. Vice-Chairman, V. J. Waltz, General Claim Agent, Toledo Railways & Light Company, Toledo, Ohio. Secretary, H. B. Potter, Boston Elevated Railways Company, Boston, Mass.

FIRST SESSION

Report of Chairman.

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Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
The Human Factor in Safe Operation and Maintenance of Rolling Stock.—F. R. Phillips, Superintendent of Equipment, Pittsburgh Railways Company, Pittsburgh, Pa. Discussion.
Co-ordination of Safety Between Transportation and Equipment Departments.—G. K. Jeffries, General Superintendent, Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind. Discussion.
Why Does Not Every Electric Railway Have a Safety Organization?—C. B. Proctor, Claim Agent, Memphis Street Railway Company, Memphis, Tenn. Discussion.
General Discussion, Question and Answers.

Thursday, October 2—9:30 A. M.

North Foyer, Mezzanine Floor.

METALS SECTION. Chairman, J. A. Oartel, Director of Safety, Carnegie Steel Company, Pittsburgh, Pa. Vice-Chairman, Homer J. Weeks, American Steel & Wire Company, Cleveland, Ohio. Secretary, W. E. Watters, National Malleable Castings Company, Melrose Park, Ill.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
Accident Prevention in a Malleable Iron Foundry.—H. L. Church, Rockford Malleable Iron Works, Rockford, Ill. Discussion.
The Personal Element in a Safety Program for the Foundry.—M. F. Gartland, Marion Gray Iron Foundry Company, Marion, Ind. Discussion.
Safety in the Steel Foundry.
General Discussion, Questions and Answers.

Thursday, October 2—9:30 A. M.

Room 341, Third Floor.

MINING SECTION. Chairman, B. F. Tillson, Assistant Superintendent, New Jersey Zinc Company, Franklin, N. J. Vice-Chairman, H. G. Davis, Lehigh & Wilkes-Barre Coal Company, Wilkes-Barre, Pa. Secretary, Wm. H. Shearman, New Jersey Zinc Company, New York City.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
Mine Accidents, English Speaking vs. Non-English Speaking Employes.—A. H. Fay, Mining Engineer, U. S. Bureau of Mines, Washington, D. C. Discussion.
Training and Handling of Men.—M. W. Gidley, Safety Inspector, Copper Queen Consolidated Mining Company, Bisbee, Ariz. Discussion.
Labor Turnover and Its Relation to Mine Accidents.—E. E. Bach, Chief, Americanization Bureau, State of Pennsylvania, Finance Building, Philadelphia, Pa. Discussion.
Industrial Relations in the Mining Industry.—Chas. F. Willis, Consulting Supervisor, Industrial Relations, Phelps Dodge Corporation, Bisbee, Ariz. Discussion.

Thursday, October 2—9:30 A. M.

Parlor E, Second Floor.

PACKERS' SECTION. Chairman, A. B. Drummond, Wilson & Company, Union Stock Yards, Chicago. Secretary, G. L. Mallery, Swift & Company, Chicago.

FIRST SESSION

Remarks by Chairman.
Appointment of Nominating Committee.
Round-Table Discussion:
(a) Knife Cuts and Their Prevention
(b) Burns and Scalds.
(c) Elevator Hazards—Gates, Clearances, Lighting.

[Note: The large number of men employed in the packing industries of the United States and the fact that various hazards are always associated with the operation of packing plants make it important that accident prevention work be developed to the highest possible degree. Safety men in these industries have felt the need of an opportunity to meet for a discussion of problems that are more or less common to them all. To provide such an opportunity and to aid them in their work, this meeting has been arranged with the thought in mind that the persons attending will proceed to organize a permanent Section of the National Safety Council.]

Thursday, October 2—9:30 A. M.

Room 343, Third Floor.

PAPER AND PULP SECTION. Chairman, A. P. Costigane, Ontario Pulp & Paper Makers' Safety Association, Toronto, Canada. Vice-Chairman, C. E. Jackson, Consolidated Water Power & Paper Company, Grand Rapids, Wis. Secretary, C. B. Milner, Hammermill Paper Company, Erie, Pa.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
How to Use Danger Signs in a Paper Mill.—G. W. Dickson, Riordon Pulp & Paper Company, Hawkesbury, Ontario, Canada. Discussion.
Sulphate and Sulphite Hazards.—Erling Riis, Wausau Sulphate Fibre Company, Mosinee, Wis. Discussion.
Report of Safe Practices Committee, followed by General Discussion of Pamphlet.—Robert Altman, Marathon Paper Mills Company, Rothschild, Wis. Discussion.

Thursday, October 2—9:30 A. M.

Lattice Room, Mezzanine Floor.

STEAM RAILROAD SECTION. Chairman, R. C. Richards, Chairman, Central Safety Committee, Chicago & North Western Rail-

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road, Chicago, Ill. Vice-Chairman, John T. Broderick, Supervisor of Special Bureaus, Baltimore & Ohio Railroad, Baltimore, Md. Secretary, F. Whittemore, Superintendent, Safety Department, Nashville, Chattanooga & St. Louis Railroad, Nashville, Tenn.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
Aims and Purposes of the Safety Section of the United States Railroad Administration.—A. F. Duffy, Manager, Safety Section, United States Railroad Administration, Washington, D. C. Discussion.
Value and Necessity of Safety Agents.—M. A. Dow, General Safety Agent, New York Central Railroad, Grand Central Terminal, New York City. Discussion.
Co-operation of Officers and Employes in Safety Work on Railroads.—R. H. Doolittle, Supervisor of Safety, Colorado Southern Railroad, Denver, Col.
[Note.—Members are requested to hand the Secretary any subject they wish discussed at the round-table meeting.]

Thursday, October 2—9:30 A. M.

Room 345, Third Floor.

TEXTILE SECTION. Chairman, David S. Beyer, Vice-President and Chief Engineer, Liberty Mutual Insurance Company, Boston, Mass. Vice-Chairman, S. Bartlett, Treasurer, S. Slater & Sons, Inc., Webster, Mass. Secretary, John Rennie, Safety Engineer, Joseph Bancroft & Sons Company, Wilmington, Del.
Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
Safety Education in the Textile Industry.—Wm. S. Ide, S. Slater & Sons, Inc., Webster, Mass. Discussion.
Standard Guards for Textile Machinery.—Henry A. Owen, General Engineer, Whitin Machine Works, Whitinsville, Mass. Discussion.
Plant and Machinery Lay-out.—Kenneth Moller, Lockwood, Greene & Company, Boston, Mass. Discussion.
General Discussion, Questions and Answers.
Report of Nominating Committee.

Thursday, October 2—9:30 A. M.

Ball Room, Mezzanine Floor.

WOMEN IN INDUSTRY SECTION. Chairman, Miss Tracy Copp, Director, Women's Department, Industrial Commission of Wisconsin, Milwaukee, Wis.

FIRST SESSION

Appointment of Nominating Committee.
Standard Working Conditions for Women in Industry.—Miss Mary Van Kleeck, Director, Division of Industrial Studies, Russell Sage Foundation, New York City. Discussion.
Responsibilities and Opportunities of the Industrial Nurse.—Miss Florence S. Wright, R. N., New Jersey State Department of Health, Trenton, N. J. Discussion.
How to Employ Women Successfully in Industrial Occupations.—C. E. Knoeppel, Industrial Engineer, New York City. Discussion.
The Women's Bureau.—Miss Mary Anderson, Director, Women's Bureau, U. S. Department of Labor, Washington, D. C. Discussion.

Thursday, October 2—12:30 P. M.

Private Dining Room No. 2, Mezzanine Floor.

EMPLOYES' PUBLICATIONS LUNCHEON ROUND-TABLE. Chairman, E. A. Wanner, Assistant Editor, *Jeffrey Service*, Jeffrey Manufacturing Company, Columbus, Ohio.
Suggested topics:
How to interest the Management to Appropriate Funds for a Plant Organ.
What Benefits should a Corporation Expect to Derive from an Employes' Publication?
What can Employes' Publications do to Promote Industrial Good-will?
What kind of Material is needed to make the Plant Periodical a Success?
How to Obtain News Items for a Plant Publication.
[Note.—Persons desiring to attend this Luncheon Round-Table should make reservation at the registration desk in advance of the meeting.]

Thursday, October 2—2 P. M.

Ball Room, Mezzanine Floor.

GENERAL SESSION: AMERICANIZATION. Chairman, Richard A. Feiss, Joseph & Feiss Company, Cleveland, Ohio.
What is an American?
Principles and Methods of the Americanization Movement.—Allen T. Burns, Director, Study of Methods of Americanization, New York City.
The Immigrant's Part.—Hans Rieg, Chief Foreign Language Division, War Loan Organization, U. S. Treasury Department, Washington, D. C.
What the Industries Can Do.—H. C. Waller, Akron, Ohio (formerly Educational Director, B. F. Goodrich Company, Akron, Ohio).
Discussion.—Geo. C. Fout, Supervisor of Night Schools, Youngstown Sheet & Tube Company, Youngstown, Ohio.
Executive Committee Meeting, 5 p. m., Private Dining Room No. 3, Mezzanine Floor.
Informal Dinner and Smoker, Ball Room, Hotel Winton, 7 p. m. [This is our annual frolic. All members and visitors at the Congress are invited. Special entertainments. Don't miss it.]

Friday, October 3—9:30 A. M.

Private Dining Room No. 2, Mezzanine Floor.

EMPLOYES' BENEFIT ASSOCIATIONS.

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Round-Table. Chairman, F. H. Elam, American Steel Foundries Company, Chicago; Vice-Chairman, Health Service Section.

FIRST SESSION

Best Form of Management.—Discussion led by Joseph N. Redfern, Superintendent, Relief, Surgical & Employment Departments, Chicago, Burlington & Quincy Railroad, Chicago.

Are Employers' Contributions Advisable?

Limitation of Beneficiaries.—Discussion led by H. J. Montgomery, Employment Department, the Wahl Company, Chicago.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Private Dining Room No. 1, Mezzanine Floor.

AUTOMOTIVE SECTION.

SECOND SESSION

Report of Nominating Committee.

Employment and Safety.—E. F. Blank, Manager of Employment & Safety, Buick Motor Car Company, Flint, Mich. Discussion.

Standardization of Guards (Experience of the Automotive Group).—J. H. Goldie, Cadillac Motor Company, Detroit, Mich. Discussion.

Experience at Nitro.—W. E. Williams, Ordnance Department, U. S. A., Nitro, W. Va. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Parlor C, Second Floor.

CEMENT SECTION.

SECOND SESSION

Hazards in Cement Stock-houses, Packing and Shipping Departments.—Russell Frame, Secretary, Central Safety Committee, Alpha Portland Cement Company, Easton, Pa. Discussion.

Platforms, Walk-ways, Stairs, Ladders, and Floors in Cement Mills. Discussion.

Blasting in Quarries.—Dr. Walter O. Snelling, Director of Research, Pennsylvania Trojan Powder Co., Allentown, Pa. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Parlor D, Second Floor.

CHEMICAL SECTION.

SECOND SESSION

Report of Nominating Committee.

The Controlling Factors in Gas Mask Design.—Dr. W. K. Lewis, Massachusetts Institute of Technology, Cambridge, Mass. Discussion.

Some Experience in Accident Prevention in the Dye Industry.—A. H. Massey, E. I. du Pont de Nemours & Company, Wilmington, Del. Discussion.

The Failure of Materials due to Chemical Action.—E. G. Rippel, Sales Manager, Buffalo Foundry & Machinery Company, Buffalo, N. Y. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Private Dining Room No. 3, Mezzanine Floor.

CONSTRUCTION SECTION.

SECOND SESSION

Report of Nominating Committee.

Safety in Steel Erection.—Col. E. A. Gibbs, the McClintic-Marshall Company, Pittsburgh, Pa. Discussion.

Results of Safety Work in Shipbuilding and How They Were Obtained.—Harry A. Schultz, American Steel & Wire Company, Cleveland, Ohio (formerly with Emergency Fleet Corporation). Discussion.

Co-operating on Safety.—F. J. Dresser, the Austin Company, Cleveland, Ohio (representing Associated General Contractors of America). Discussion.

General Discussion, Questions and Answers

Friday, October 3—9:30 A. M.

Electrical League Dining Room, Fourteenth Floor.

ELECTRIC RAILWAY SECTION.

SECOND SESSION

Report of Nominating Committee.

Nationalizing and Standardizing Accident Prevention.—Harry Reid, President, Interstate Public Service Company, Louisville, Ky. Discussion.

Electric Railway Hazards—Causes, Effects and Remedies.—R. E. McDougall, Claim Agent, New York State Railways, Rochester, N. Y. Discussion.

Safety Before and After the War.—E. F. Schneider, General Manager, Cleveland, Southwestern & Columbus Railway Company, Cleveland, Ohio. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

South Foyer, Mezzanine Floor.

HEALTH SERVICE SECTION. Chairman, Dr. Chas. A. Lauffer, Medical Director, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Vice-Chairman, F. H. Elam, American Steel Foundries, Chicago. Secretary, Dr. C. P. Selby, formerly Consulting Hygienist, U. S. Public Health Service, Washington, D. C.

FIRST SESSION

Report of Chairman.

Report of Secretary.

Reports of Committees.

Appointment of Nominating Committee.

Industrial Health Hazards.—Dr. C. A. Lauffer, Medical Director, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Discussion by representative of National Tuberculosis Association.

The Subnormal Worker (Pathological).—Dr. Alfred Stengel, Professor of Medicine, University of Pennsylvania, Philadelphia, Pa.

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Discussion by Dr. F. E. Schubmehl, General Electric Company, West Lynn, Mass.

Industrial Dermatoses (Sources, Types, Control).—Dr. Wm. Allen, Pusey, Chicago. Discussion by Dr. John G. Burke, Jenkins Arcade, Pittsburgh, Pa.

Bad Teeth and Fatigue.—Dr. Weston A. Price, President of the Research Institute of the National Dental Association, Cleveland, Ohio. Discussion by Dr. H. M. Brewer, Dental Dispensary, National Cash Register Company, Dayton, Ohio.

Friday, October 3—9:30 A. M.

Room 345, Third Floor.

LOCAL COUNCIL OFFICERS. Chairman, C. W. Price, General Manager, National Safety Council.

FIRST SESSION

The Experience of a Large City in Local Council Work.—Carl Smith, Public Safety Field Secretary, National Safety Council. Discussion. R. B. Morley, Secretary-Treasurer, Ontario Safety League, Toronto, Ontario, Canada.

The Experience of a Small City in Local Council Work.—P. S. Case, Union Carbide Company, Niagara Falls, N. Y.; Secretary-Treasurer, Niagara Frontier Local Council. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

North Foyer, Mezzanine Floor.

METALS SECTION.

SECOND SESSION

Consider the Crane.—C. C. Rausch, Assistant Director, Safety Institute of America, New York City. Discussion O. J. Lewis, McKinney Steel Company, Cleveland, Ohio.

New Ways to Put Safety Across in a Steel Plant.—H. P. Heyne, United Alloy Steel Corporation, Canton, Ohio. Discussion. H. W. Darr, Cambria Steel Company, Johnstown, Pa.

Practical Demonstration of Investigating Accidents.—Court of Inquiry staged by H. J. Weeks with employes of American Steel & Wire Company. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Room 341, Third Floor.

MINING SECTION.

SECOND SESSION

Fire Prevention in Anthracite Coal Mines and Necessary Equipment for Fighting Mine Fires.—M. W. Price, Efficiency Engineer, G. B. Markle Company, Jeddo, Pa. Discussion.

Effective Use of Rescue Apparatus in the Fighting of Mine Fires.—T. Ryan, Mine Safety Appliance Company, Pittsburgh, Pa. Discussion.

The Desirability of Standardizing Mine Rescue Training and a Plan for Standardization.—D. J. Parker, Mine Safety Engineer, U. S. Bureau of Mines Experiment Station, Pittsburgh, Pa. Discussion.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Parlor E, Second Floor.

PACKERS' SECTION.

SECOND SESSION

Report of Nominating Committee.

Round-Table Discussion:

(a) Safe-Guarding Packing House Machinery. Sausage grinders, hashers, back fat skinning machines, head splitters, horn and bone saws, fatting machines, miscellaneous machines.

(b) Loading and Trucking Hazards. Car loading, gang-planks, hand and power trucks, overhead trolleys, rails, and switches.

(c) Slipping and Tripping Hazards.

Friday, October 3—9:30 A. M.

Room 343, Third Floor.

PAPER AND PULP SECTION.

SECOND SESSION

Report of Nominating Committee.

Some Unsafe Practices in Paper Mills—Their Cost in Money and Men.—H. H. Matthieson, Safety Director, Crown Willamette Paper Company, Portland, Ore.,

How to Make Safety Meetings Interesting.—S. F. Shattuck, Kimberly-Clark Company, Neenah, Wis.

Poster Talk.—Al Kroes, Employers' Mutual Liability Insurance Company, Wausau, Wis.

General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Library, Main Floor.

PUBLIC SAFETY SECTION. Chairman, C. M. Talbert, Director, Department of Streets and Sewers, St. Louis, Mo. Vice-Chairman, J. H. Harvey, The Bracken Company, Kansas City, Mo. Secretary, Dr. Wm. Burgess, Chicago.

FIRST SESSION

Report of Chairman.

Report of Secretary.

Reports of Committees.

Appointment of Nominating Committee.

What Boy Scouts Can Do For Safety.—L. W. Barclay, Director of Education, Boy Scouts of America, New York City. Discussion.

Elevator Hazards Affecting the General Public.—Dana Webster, Safety Inspector, Aetna Life Insurance Company, Indianapolis, Ind. Discussion.

Proper Personnel of a Public Safety Committee.—J. M. Quigley, Chief of Police, Rochester, N. Y. Discussion.

[The remainder of this session will be devoted to a general round-table discussion. Among the subjects to be discussed is the establishment of a National Traffic Code embodying the principles of traffic regulation.]

Friday, October 3—9:30 A. M.

Electrical League Club Room, Fourteenth Floor.

PUBLIC UTILITIES SECTION. Chair-

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man, C. E. Paige, Malden & Melrose Gas Light Company, Malden, Mass. Vice-Chairman, Herman Spoehrer, Union Electric Light & Power Company, St. Louis, Mo. Secretary, S. H. Reid, Bureau of Safety, Chicago.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Reports of Committees.
Appointment of Nominating Committee.
Preventing Accidents in Gas Plants—J. F. Conner, Safety Supervisor, the United Gas Improvement Company, Philadelphia, Pa. Discussion. A. O. Mitchell, Adjuster, Northern Indiana Gas & Electric Company, Hammond, Ind.
Inspection of Plants of Gas Companies. Alvin E. Bliss, General Superintendent, Charles H. Tenney & Company, Boston, Mass. Discussion. H. A. Johnson, Omaha Gas Company, Omaha, Neb.
Effective Means of Focusing the Responsibility for the Prevention of Accidents upon Foremen.—J. W. Easley, Kansas City Home Telephone Company, Kansas City, Mo. Discussion. H. C. Lucas, Secretary-Treasurer, Philadelphia Electric Company, Philadelphia, Pa.
General Discussion, Questions and Answers.

Friday, October 3—9:30 A. M.

Lattice Room, Mezzanine Floor.

STEAM RAILROAD SECTION.

SECOND SESSION

Organized Labor's Interest in Safety Work.—W. G. Lee, President, Brotherhood of Railway Trainmen, Cleveland, Ohio. Discussion.
Safety Suggestions—How they should be Treated and Disposed of.—T. H. Carrow, Supervisor of Safety, Pennsylvania Railroad, Philadelphia, Pa. Discussion.
Methods of Selecting Committees and Maintaining Interest in Safety.—Robert Scott, Superintendent of Insurance and Safety, Atlantic Coast Line Railroad, Wilmington, N. C. Discussion.
Report of Nominating Committee and Election of officers.
[Note—Members are requested to hand the Secretary any subject they wish discussed at the round-table meeting.]

Friday, October 3—9:30 A. M.

Ball Room, Mezzanine Floor.

WOMEN IN INDUSTRY SECTION.

SECOND SESSION

Report of Nominating Committee.
Selection and Training of Woman Industrial Workers.—Mrs. Anna L. Burdick, Special Agent for Trade and Industrial Education for Girls and Women, Federal Board for Vocational Education, Washington, D. C. Discussion.
Supervision of Woman Industrial Workers.—Miss Maynard Downes, Service Secretary. Robert A. Johnston Company, Milwaukee, Wis. Discussion.
The Future of Woman as an Industrial Worker.—Miss Ida M. Tarbell.
General Discussion, Questions and Answers

Friday, October 3—9:30 A. M.

Room 325, Third Floor.

WOOD-WORKING SECTION. Chairman, J. E. Rhodes, Secretary-Treasurer, Southern Pine Association, New Orleans, La. Secretary, F. A. Barker, Resident Manager, Lumbermen's & Manufacturers Insurance Agency, Milwaukee, Wis.

FIRST SESSION

Report of Chairman.
Report of Secretary.
Report of Committees.
Appointment of Nominating Committee.
Safety in Operating Lumber Yards. Discussion.
Methods of Securing Co-operation of Workmen in Using Safeguards.—Holger Jensen, Manager, Inspection & Rating Bureau, Maryland Casualty Company, Baltimore, Md. Discussion by L. A. Kling, Superintendent, Kuhlman Car Company, Cleveland, Ohio.
Hazards in Box Manufacturing Plants.—C. R. Miller, Operating Manager, Rathborne, Hair & Ridgeway, Chicago. Discussion.
General Discussion, Questions and Answers.

Friday, October 3—12:30 P. M.

Private Dining Room No. 2, Mezzanine Floor.

LUNCHEON ROUND-TABLE. Chairman, F. M. Rosseland, Safety Engineer, National Safety Council.
Subject: *The Safety Bulletin.*
Size, and Amount of Copy.
Grewsome Bulletins.
Humorous or Cartoon Bulletins.
Should Bulletins be Commendatory or Critical?
Should Bulletins be General or Specific?
[Persons desiring to attend this luncheon should make reservation at the registration desk before 10 o'clock on Friday.]

Friday, October 3—2 P. M.

Ball Room, Mezzanine Floor.

GENERAL SESSION: HEALTH. Chairman, Dr. Chas. A. Lauffer, Medical Director, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.
The Scope of Physical Examination in Industry.—Dr. C. D. Selby, Toledo, Ohio, formerly Consulting Hygienist, United States Public Health Service.
The Industrial Clinic.—Dr. D. L. Edsall, Dean, Harvard Medical School, Cambridge, Mass.
Health Education in Industry.—Dr. W. A. Evans, Chicago.
Co-ordination of Industrial and Community Health Activities.—Dr. C. E. Ford, General Chemical Company, New York City. Discussion.

Friday, October 3—2 P. M.

Lattice Room, Mezzanine Floor.

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STEAM RAILROAD SECTION. Round-Table Discussion.

J. T. Broderick, Supervisor of Safety, Baltimore & Ohio Railroad, Baltimore, Md., will preside. Members are requested to hand the Secretary any subject they wish discussed at this round-table meeting.

Friday, October 3—7 P. M.

Ball Room, Mezzanine Floor.

ANNUAL BANQUET (Informal). Chairman, S. W. Tener, President, Northeastern Ohio Division, National Safety Council, Cleveland, Ohio. Toastmaster, A. C. Brown, President, Brown Hoisting Machinery Company, Cleveland, Ohio.

Speakers: James Speyer, Treasurer, Safety Institute of America, New York; Teamwork in Safety. R. W. Campbell, Chairman, Central Committee on Safety, Illinois Steel Company, Chicago; Safety, the Pioneer.

Entertainment.

Patriotic Songs.

Saturday, October 4—9:30 A. M.

Private Dining Room No. 2, Mezzanine Floor.

EMPLOYES' BENEFIT ASSOCIATIONS. Round-Table.

SECOND SESSION

Benefits to Ex-Employes. Discussion led by W. L. Chandler, Assistant Secretary and Treasurer, Dodge Manufacturing Company, Mishawaka, Ind. Discussion.

Selling the New Employe. Demonstration by M. C. Evans (The Employment Manager) and F. E. Chapman (The New Employe), International Harvester Company, Chicago.

Report of Committee on Statistics. Discussion led by J. M. Eaton, Lincoln Motor Company, Detroit, Mich.—Discussion.

General Discussion, Questions and Answers.

Saturday, October 4—9:30 A. M.

Room 345, Third Floor.

LOCAL COUNCIL OFFICERS.

SECOND SESSION

How to Finance a Small Local Council.—F. W. Pardee, Treasurer and Business Manager, National Safety Council. Discussion.

How to Conduct Schools for Safety Supervisors and for Foremen.—Thomas Stanion, Safety Engineer, Aluminum Castings Company, Cleveland, Ohio. Discussion.

The Cincinnati Local Council Plan.—G. H. McClain, Secretary, Cincinnati Local Safety Council.

General Discussion, Questions and Answers.

Saturday, October 4—9:30 A. M.

South Foyer, Mezzanine Floor.

HEALTH SERVICE SECTION.

SECOND SESSION

Report of Nominating Committee.

Malingering, Involving the Problem of Getting the Sick or Injured Employe Back to Work.—Dr. Judson C. Fisher, Chief Medical Examiner, Globe Indemnity Company, New York. Discussion. Geo. P. Hambrecht, Chairman, Industrial Commission of Wisconsin, Madison, Wis.

The Treatment of Burns.—Dr. W. I. Clark, Norton Company, Worcester, Mass. Discussion. Dr. A. W. Colcord, Carnegie Steel Company, Clairton, Pa.

What the War Has Taught Us in Surgery.—Dr. Geo. W. Crile, Cleveland, Ohio. Discussion. Dr. J. J. Moorhead, Interborough Traction Company, New York City.

Saturday, October 4—9:30 A. M.

Private Dining Room No. 1, Mezzanine Floor.

MARINE AND NAVIGATION SECTION. Chairman, Geo. W. Wylie, Clyde Steamship Company, New York City.

Round-Table Discussion of Marine and Navigation hazards, and plans for future activities of this Section.

Saturday, October 4—9:30 A. M.

North Foyer, Mezzanine Floor.

METALS SECTION.

THIRD SESSION

Report of Nominating Committee.

How the Foremen Cut Lost Time Accidents.—James F. Belford, Acting Secretary of Labor, Safety and Welfare, American Smelting & Refining Company, New York City. Discussion. E. E. Judd, American Smelting & Refining Company, Omaha, Neb.

Humanizing a Steel Plant.—Philip Stremmel, Superintendent, Hot Mills, National Enameling & Stamping Company, Granite City, Ill. Discussion. Raymond G. Adair, Safety Engineer, American Rolling Mills Company, Middletown, Ohio.

Practical Demonstration of Welding and Cutting.—J. Schleicher, the Alexander Milburn Company, Baltimore, Md. (All present to have welding goggles furnished by various manufacturers.) Discussion.

General Discussion, Questions and Answers.

Saturday, October 4—9:30 A. M.

MINING SECTION.

Room 341, Third Floor.

THIRD SESSION

Report of Nominating Committee.

A Compilation of Chute Types for Loading Ore Into Tram Cars in Metal Mines.—C. A. Mitke, Mining Engineer, Phelps Dodge Corporation, Bisbee, Ariz. Discussion.

The Importance of Safety Measures to the Miner.—Major Arthur S. Dwight, Chairman, Industrial Organization Committee, American Institute of Mining Engineers, New York City. Discussion.

Need for a Definite Technical Service in the Mining Section of the National Safety Council.—B. F. Tillson, Assistant Superintendent, New Jersey Zinc Company, Franklin, N. J. Discussion.

General Discussion, Questions and Answers.

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Saturday, October 4—9:30 A. M.

Library, Main Floor.

PUBLIC SAFETY SECTION.

SECOND SESSION

Report of Nominating Committee.

Safety Week in St. Louis—Essentials, Non-Essentials, and Cost.—Carl L. Smith, Public Safety Field Secretary, National Safety Council. Discussion.

A Plan for Public Safety as Demonstrated in St. Louis and Endorsed by the Executive Committee of the Public Safety Section.—C. M. Talbert, Director, Department of Streets and Sewers, St. Louis, Mo., and Chairman of Public Safety Section. Discussion.

Public Accidents.—Frederick S. Crum, Assistant Statistician, Prudential Insurance Company, Newark, N. J. Discussion.

General Discussion, Questions and Answers.

Saturday, October 4—9:30 A. M.

Parlor D, Second Floor.

RUBBER SECTION. Chairman, E. H. Fitzgerald, Federal Rubber Company, Cudahy, Wis.

Round-Table Discussion:

Mill and Calender Hazards.
Handling Tire Cases.
Opening of Tire Moulds After Curing.
Stacking of Finished Tires.
Guarding Washers and Crackers.
Poison Hazards in Rubber Industries.

Members attending this session will discuss and decide whether a permanent Rubber Section shall be organized.

Saturday, October 4—9:30 A. M.

Electrical League Club Room, Fourteenth Floor.

PUBLIC UTILITIES SECTION.

SECOND SESSION

Report of Nominating Committee.

Working Safely on Live High Tension Lines.—H. J. Burton, Consumers' Power Company, Jackson, Mich. Discussion. Wills Maclachlan, Electrical Employers' Association, Toronto, Canada.

Practices of Operators and Tagging of Switches, Markings, and Barriers.—Walter Wagner, Philadelphia Electric Company, Philadelphia, Pa. Discussion. C. B. Scott, General Manager, Bureau of Safety, Chicago.

Spasmodic Safety Efforts and the Harmful Results.—H. M. Webber, Superintendent, Department of Claims, Chicago Telephone Company, Chicago. Discussion.

General Discussion, Questions and Answers.

Saturday, October 4—9:30 A. M.

Lattice Room, Mezzanine Floor.

STEAM RAILROAD SECTION.

THIRD SESSION

Causes of and Remedies for Accidents in Engine and Train Service. Discussion.

Importance of Proper Inspection of Tools Used in Shops and by Maintenance of Way Gangs.—G. L. La Fountaine, General Safety Supervisor, Great Northern Railroad, St. Paul, Minn. Discussion.

Motor and Hand Car Accidents.—J. L. Walsh, Superintendent of Safety, Missouri, Kansas & Texas Railroad of Texas, Dallas, Texas. Discussion.

Saturday, October 4—9:30 A. M.

Room 325, Third Floor.

WOOD-WORKING SECTION.

SECOND SESSION

Report of Nominating Committee.

Accidents in Logging Operations and How They May Be Reduced.—James Boyd, *Lumber Trade Journal*, New Orleans, La. Discussion.

Does It Pay to Employ Safety Engineers in the Wood-Working Industry?—Hon. T. J. Duffy, Chairman, Ohio State Industrial Commission, Columbus, Ohio. Discussion.

Accident Prevention in Canadian Wood-Working Plants.—Frank Hawkins, Secretary, Lumbermen's Safety Association, Ottawa, Canada. Discussion.

General Discussion, Questions and Answers.

Saturday, October 4—2 P. M.

Ball Room, Mezzanine Floor.

GENERAL SESSION: SAFETY EDUCATION. Chairman, A. W. Whitney, General Manager, National Workmen's Compensation Service Bureau, New York City.

The Place of Education in the Safety Movement.—R. M. Little, Director, Safety Institute of America, New York City.

Teaching Safety in Public Schools.—Dr. E. Geo. Payne, Principal, Harris Teachers' College, St. Louis, Mo. (Dr. Payne is the author of "Education in Accident Prevention," a treatise showing how accident prevention may be made a part of regular school instruction.)

Demonstration by Cleveland School Children.

National Association of Industrial Dental Surgeons

The annual conference of the National Association of Industrial Dental Surgeons will be held at the Hotel Statler, Cleveland, Friday, October 3, 1919. For further information regarding this meeting, address the Secretary, Dr. E. L. Pettibone, 6503 Detroit Avenue, Cleveland, Ohio.

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The Safety Exposition at the Grays' Armory, Cleveland

September 29 to October 4

AS science and industry proceed together, as theory and practice keep in step, it is fitting that at the Annual Congress of the National Safety Council, a Safety Exposition should be presented under the joint auspices of the National Safety Council and the Safety Institute of America. The 1919 exhibition has assumed such size and importance that it can scarcely be termed a commercial adjunct.

The sessions of the Congress are to be so numerous that the visitor who strives conscientiously to follow the proceedings may have only limited time to devote to the exposition.

Therefore, SAFETY ENGINEERING has secured from the exhibitors brief summaries of what will be shown. The intending visitor is advised to give advance study to this synopsis so that he will be sure to investigate the things of most interest to him and meet men he has not had an opportunity to meet before.

The numerals at the right of the columns indicate the location of the exhibit on the diagram printed herewith.

ACME MOTION PICTURE PROJECTOR CO., Chicago **C-14**

Mr. Oscar J. Holmes, Sales Mgr., and George E. Swan in charge.

Will exhibit the Acme portable projector which is of the suitcase type, 17 inches long, 18 inches high and 7¾ inches wide. This machine is motor driven, can be used on either A. C. or D. C. current, takes the standard width 1,000-foot reels and weighs only 24 pounds. Adopted by the safety engineers of U. S. Gov., U. S. Steel Corp., Aetna Ins. Co., etc., etc.

AETNA LIFE INSURANCE CO., Hartford, Conn. **B-8**

E. P. Elzy, Supt. Bureau of Inspection and Accident Prevention.

The exhibit consists of a factory building, two stories in height, a boiler house, with towering brick chimney alongside, and the surrounding factory yard. The front wall of the main building has been left off and inside may be seen many safeguards as applied to engines, transmission shafting and belts, gears, elevated platforms, stairs, floor openings, elevators, elevator landings, hoistways, ladders, trucks, etc. Shafts, gears and belts are in busy operation under power supplied from the engine in one corner.

In the boiler house are shown the proper and safe method of piping the safety-valve, the blow-off discharge which leads to an overflow tank with its safety vent, the safety gauge glass, etc.

In the yard outside a diminutive train moves along rails equipped with safe crossings and other desirable features. Nearby, correct and safe methods of piling material are shown and even excavation work is in progress with its accompanying illustrations of practical ideas applied to safeguarding the operation.

The unguarded and hazardous conditions shown are not as numerous as the safety features, but the two together, as told in their respective colorings of red and green, present a vivid and impressive story of accident prevention work.

AMERICAN ABRASIVE METALS CO. New York **D-7**

Messrs. H. W. Mowery, H. L. Walters and Jos. W. Loeb in attendance.

The exhibit will consist of Feralun Anti-Slip Floor Plates, Stair Treads, Ladder Shoes; VULCALUN Anti-Slip Floor Plates, Stair Treads, Ladder Shoes; FERALUN Brake Shoes for Truing Wheels; FERALUN Rabble Blades and Pug Mill Paddles.

AMERICOLITE CO., New York **LEFT HAND RECEIVING ROOM**

Messrs R. M. Beard and H. Gardner in attendance.

Will exhibit the three different sizes of the 102 model Americolite, and in addition to their own exhibit they have arranged to illuminate the entire exhibition hall so that visitors may have a chance to judge of the efficiency of this fixture in large work.

AMERICAN ATMOS CORP'N, Wilkinsburg Station, Pittsburgh **A-6**

F. F. Morris, Pres.

Exhibit will consist of Mine Rescue Apparatus, Self-contained breathing apparatus for industrial use, Resuscitation apparatus, including Pulmotors and Oxygen Inhalators, Gas Masks.

AMERICAN-LA FRANCE FIRE ENGINE CO., Inc., Elmira, N. Y. **C-2**

R. C. Engels in attendance.

Showing full line of "La France Safety Devices" comprising Safety Signs, Pure Air Supply Apparatus, Gas Filter Masks, First-Aid Equipment and Supplies, Bulletin Boards and Blackboards, Rubber Gloves,

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Safety Non-Explosive Cans, Steel Lockers, Safety Ladders and Trestles, Respirators, Respirator Masks and Hoods, Emergency Breathing Devices, Goggles, Playground Equipment, Mechanics' Gloves, Fireproofed Clothing, Gloves and Leggings, Safety Portable Lights, Watchman's Clock and Fire Equipment.

AUTO INDICATOR CO. **C-15**
Grand Rapids, Mich.

Chas. O. Blackford, Gen. Sales Mgr., and Stanley G. Smith in attendance.

Will exhibit the Auto Indicator, a safety signal to be carried on the rear of motor vehicles for protection against rear-end collisions.

BENJAMIN ELECTRIC MFG. CO., **C-17**
Chicago

BUDA COMPANY **A-5 & 7**
Chicago

Represented by Messrs. C. H. Bull, J. J. Gard and M. A. Evans.

Will exhibit the Buda safety crossing gate and the Buda No. 19 section motor car.

CENTRAL ELECTRIC CO., **A-16**
Chicago

A. L. Arenberg, F. L. Warner, O. R. Anthony and C. F. Powers, in attendance

Exhibit will consist of a complete display of industrial lighting reflectors.

CLEVELAND BLOW PIPE & MFG. CO., Cleveland **D-12**

Represented by Messrs E. Coney and Clements.

The display will consist of motor driven exhaust fan, dust collector, necessary pipe and elbows leading to hoods for use on buffing, polishing and emery wheels, constituting a complete dust collecting system for the removal of dust from grinding rooms. Photographs will also be shown of installations made throughout the country, together with safety guards for machines. It is possible that their sheet metal showers may also be shown.

JAMES B. CLOW & SONS, **C-8**
Chicago

CONSOLIDATED EXPANDED METAL COS., **A-8 & B-7**
Braddock, Pa.

Mr. C. M. Stewart.

Will probably exhibit a wide variety of machine guards constructed of "Steelcrete" expanded metal. Illustrating the readiness with which, in connection with their angle iron frames and steelcrete clips, this material can be adapted to the most difficult problems.

DE VRY CORPORATION, **D-14**
Chicago

Mr. A. E. Gundelach, sales manager, in charge.

Will show the DeVry Portable Projector for motion pictures and explain the absolute portability of the outfit as combined with professional quality.

FORD MOTOR CO., **B-6 & C-5**
Detroit,

Will show different safety devices and safety literature which they regard as directly responsible for reducing accidents in their plant,

WARREN M. FRISBIE **E-3**
Ypsilanti, Mich.

Mr. W. M. Frisbie in attendance.

Will show the Frisbie saw guard mounted on a sawing machine. There will be several other guards on exhibition, giving a very clear idea of their construction and operation.

GENERAL ELECTRIC CO., **B-12, 14 &**
Schenectady, N. Y. **C-11, 13**

Represented by C. L. York, Safety Engineer.

Will show large line of various types and capacities of safety control apparatus, safety enclosed switches and remote control equipment with a broad range of application.

GLAUBER BRASS MFG. CO., **A-11**
Cleveland

Mr. A. I. Fischer, Paul Kreutzer and John Wirtz in attendance.

Exhibit will show the various types of sanitary drinking fountains and sanitary industrial fixtures including the sanitary wash-up fixtures which have lately been proven necessary in the prevention of skin disease epidemics in large plants. All of these fixtures will be arranged for demonstration to visiting safety men.

GRETHER FIRE EQUIPMENT CO., **E-1**
Dayton, O.

Mr. F. E. Grether in charge.

Will exhibit a line of hand electric searchlights such as have done heavy safety duty for seven years in fire department service and which were widely used by both Navy and Army during the war. The effectiveness of these lamps has led the manufacturers to enter the accident prevention and protection field.

F. A. HARDY & CO., **C-7**
Chicago

Mr. C. A. Kingsbury in charge.

Will display a complete line of Safety First-aid and welfare equipment and supplies which will include their full line of safety goggles for every eye protection purpose.

THE HEXTER-STEWART CORP., **D-10**
Cleveland

Messrs. Gerson, Stewart and Moses will be present.

The exhibit consisting principally of liquid soaps and disinfectants.

HOWE SAFETY APPLIANCE CO. **D-13**
Granite City, Ill. **& 15**

Represented by Mr. A. F. Howe, Pres., and Mr. J. T. Daniel, Sales Mgr.

Will exhibit complete line of the Howe automatic saw, jointer and emery wheel safe guards; and will also display their No. 3 safe emery wheel stand, safety railroad car blocker and other devices. It is intended to have certain guards placed properly on motor-driven machines to show operation in actual practice.

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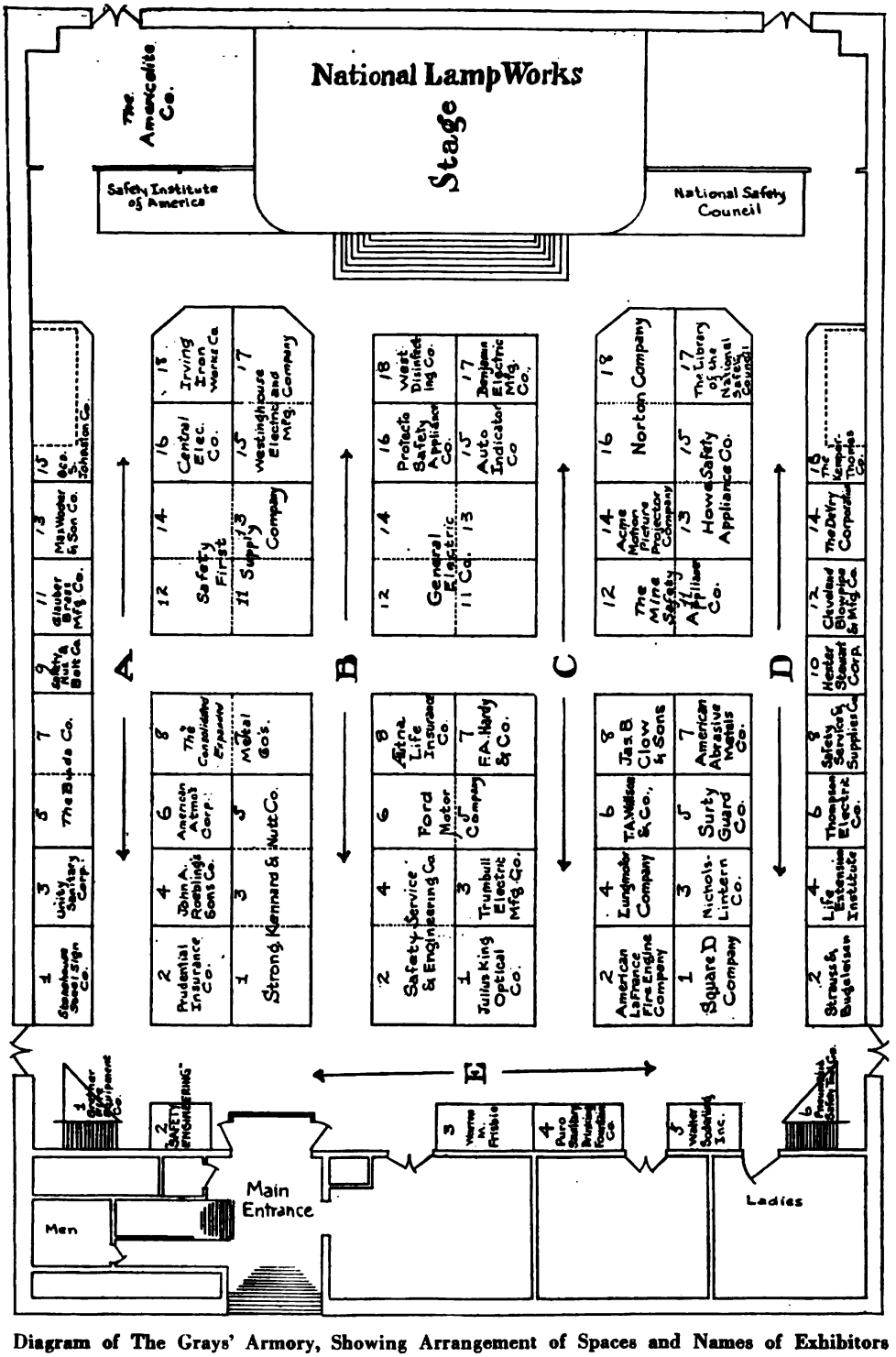

Diagram of The Grays' Armory, Showing Arrangement of Spaces and Names of Exhibitors

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IRVING IRON WORKS CO., Long Island City, N. Y. A-18

Mr. W. E. Irving, P. L. Price and F. N. Dodge in attendance.

Exhibit will consist of platform made up of the different sizes and types of Irving-Subway. This platform will have two small starways leading to it in which will be installed Irving safety steps.

GEO. S. JOHNSTON CO., Chicago A-15

Mr. C. A. Partenheimer, Factory Manager, in charge.

A feature of this exhibit is the "Weldoglas" Goggle, particularly designed for acetylene welders. This goggle contains scientific welding lenses that eliminate the ultra-violet and infra-red rays. The frame is made of fibre, is smooth, is adjustable to the size of the face and assures considerable comfort.

Another item of interest is the dark weldoglas lenses designed for electric welders. This glass supplants the old three-piece variety and has the red and blue glass, combining all of the features of these three pieces of glass in one, and at the same time gives better vision and greater illumination. This glass is being supplied in the new Johnston welding helmets and hand shields.

KEMPER-THOMAS CO., Cincinnati D-16

Clarence W. Payne in charge.

Will show cloth caps, fibre caps, cloth and rubber aprons and fibre sleeve protectors.

These articles are all printed with the words "Safety First" in a prominent place and the caps are especially recommended for female workers whose loose hair is a source of danger.

JULIUS KING OPTICAL CO., New York C-1

Represented by Messrs. Walter G. King and Fred W. King, Joe Duffy from Chicago, and Herman Saunders of Pittsburgh.

This exhibit will consist of some new types of helmets, masks and shields which they developed while engaged in war work. Especially a novel and original mask intended especially for oxy-acetylene work and claimed by the makers to be of extraordinary efficiency.

LIBRARY OF THE NATIONAL SAFETY COUNCIL D-17

LIFE EXTENSION INSTITUTE, Inc., New York D-4

Mr. Colvin, Mgr. Industrial Group Dept., in attendance.

Will show large panels in the form of screens, exhibiting photographs of the various stages of physical examinations as advocated by the institute. Weekly health posters, charts and statistics dealing with mortality, care of feet, correction of flat foot, correct feeding, influence of under-weight and over-weight on mortality and specimens of X-ray work on chest, abdomen and teeth will be displayed.

LUNGMOTOR COMPANY, Boston C-4

Mr. L. D. Jones and J. M. Booher, M.D., in charge.

The lungmotor and breathing device will be shown and its function in resuscitating men from drowning, electric shock, and asphyxiation will be demonstrated.

MINE SAFETY APPLIANCES CO., Pittsburgh D-11 & C-12

Represented by Messrs. Ryan, Deike, Burrell, Mason, Nelms and Trego.

Will exhibit Edison electric safety mine lamp, Gibbs oxygen breathing apparatus, M. S. A. ½-hr. oxygen breathing apparatus, Burrell gas detector, Burrell gas mask, anemometers, barometers, scientific instruments, oxygen inhalators, etc.

NATIONAL LAMP WORKS, of General Electric Co., Cleveland Stage

In charge of A. S. Turner, Jr., for the Edison Lamp Works, and L. C. Kent and G. R. Lawall for the National Lamp Works.

The front will represent a porch extended over the entire front of the stage, decorated with plants, flowers, and furniture. The porch will serve as a reception space for visitors and is an ideal spot to attract their attention with a movie screen preaching its silent sermon on safety work.

From this porch will open the two rooms making up the main part of the exhibit. In one an actual machine shop will be set up to show "Safe Lighting in the Shop." Three systems of lighting will be installed to show the poor lighting so commonly found in small shops; fair lighting, such as is installed by the individual who realizes the necessity for better light but who does not know just how to get it; and a system which will illustrate the very best practice not only covering "Safety in the Shop," but with the attention paid to elimination of glare, proper working intensity, and uniform distribution, which means the best working conditions in general and therefore, maximum production.

NORTON COMPANY, Worcester, Mass. C-16 & 18

Messrs. T. S. Green, R. E. Nugent and A. Rousseau in attendance.

Exhibit will consist chiefly of a display of alundum slip-proof tile. They will also have on display a Norton floor grinding machine completely equipped with Norton hoods.

NICHOLS-LINTERN CO. Cleveland D-3

Messrs. Wm. Lintern and A. R. Lintern in attendance.

The exhibit will consist of demonstrations of the N.-L. indicating signal and the Lintern electro magnetic sander.

The indicating signals are for the rear end of electric cars and have proven great current savers and accident preventers. The sander is widely used on traveling cranes, preventing skidding, wheel spinning or danger hazard with consequent loss of time.

PNEUMATIC SAFETY TOOL CO., Boston E-6

Mr. F. K. Daggett, Vice Pres. and Gen. Mgr., in charge.

Will show tools for pneumatic drills, and if compressed air is not available inside, endeavor will be made to show tools in operation outside.

PROTECTO SAFETY APPLIANCE CO. Newark, N. J. B-16

Mr. A. E. Davidson in attendance.

Exhibit will consist of all safety appliances such as helmets, oxygen inhalators, dust masks, air line helmets, smoke helmets, etc.

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PRUDENTIAL INSURANCE CO. OF AMERICA, Newark, N. J. A-2

Mr. Frederick S. Crum, Asst. Statistician, and Mr. C. H. L. Balck in charge.

The exhibit will consist of twenty-seven standard size charts (3 x 2 feet) all dealing with the general subject of mortality from accidents in industry and from public accidents. The charts exhibited have been reproduced in miniature size (8½ x 5½ inches) and a set of these reproductions will be sent free to anyone handing their names to the attendants in charge of the exhibit.

PURO SANITARY DRINKING FOUNTAIN CO., Haydenville, Mass. E-4

Mr. G. A. Cooper, Sales Manager, in charge.

Will show a Puro Liberty pedestal fountain; also a regular cooler with the combination drinking fountain and faucets which is especially designed for hotels, restaurants and cafeterias; and various types of the regular Puro sanitary drinking fountain, endeavoring to show every type of fountain acknowledged to be essential to the health and welfare of industrial organizations.

JOHN A. ROEBLING'S SONS CO., Cleveland A-4

Messrs. R. R. Newell and J. C. DeGarmo in attendance.

Will exhibit the Blue Center Steel Wire Rope Slings.

SAFETY FIRST SUPPLY CO., Pittsburgh A-12 & 14 and B-11 & 13

In attendance: H. Blain Lacy, Pres.; H. W. Dinker, Treas.; L. B. Snyder (representing Cleveland and Eastern Ohio), and F. E. Boli (representing Northern New York and Michigan).

The exhibit is designed to show the capability of the organization to serve practically every industry in their requirements for safety, accident prevention and welfare.

Special prominence will be given to Diamond illuminated bulletin boards, and these boards will be used to display other specialties such as goggles, protective gloves, respirators, etc. Sample machine guards of Diamond expanded metal, riveted to angle iron frames, will show the wide extent of the company's work in this line. The center of the space will be a 10-foot pyramid of Diamond porcelain enamel signs. A complete display of goggles, a recently developed cork helmet, Diamond all steel playground apparatus including slides, giant strides, swings, etc.; Diamond first-aid specialties including Diamond first-aid finger cots and eye shields, and the canister or stretcher case containing stretchers, blankets and first-aid supplies in dry and sanitary condition; safety cans, oilers, suggestion systems, ladder shoes, drinking fountains, saw and punch press guards are among the numerous other items on display.

SAFETY NUT & BOLT CO., Cleveland A-9

SAFETY ENGINEERING "The Magazine of Safety" E-2

In charge of Mr. Richard V. Pitman, Director of the Service Dept. of the magazine.

Messrs. Franklin Webster, Pres., and F. V. Clark, Adv. Mgr., will be in attendance.

This is the only commercial publication exclusively devoted to the protection of life and property.

Be sure to register at this booth to be known as "Among those present."

SAFETY SERVICE & ENGINEERING CO., Cleveland B-2 & 4

Mr. Oscar McNab in charge.

Will exhibit positive stop punch press guard, the Westinghouse saw guard and standard sectional belt and pulley guards.

SAFETY SERVICE & SUPPLIES CO., Chicago D-8

Mr. Roy E. Smith in charge.

Will show a number of safety and danger signs, especially those showing the National Safety Council danger emblem. Prizes for safety co-operation, books on safety, bulletin boards, goggles, masks, asbestos gloves, shoes, fire extinguishers, machinery guards, hospital supplies and playground apparatus.

WALTER SODERLING Inc., New York E-5

Mr. Walter Soderling.

Will exhibit the Dustite respirator which has passed the tests of the Underwriters' Laboratories for material, workmanship, comfort and efficiency.

SQUARE D CO., Detroit D-1

Mr. L. D. Calhoun in charge.

Will show electrical safety devices featuring the Square D line of safety switches.

STONEHOUSE STEEL SIGN CO., Denver, Colo. A-1

J. W. Stonehouse, Pres.

Exhibit will cover entire line of Standard stock signs and tags, all for accident prevention (over a thousand). There will also be displayed some new signs with patented self-fastening devices permitting porcelain enamelled steel signs to be fastened to any size, style or kind of a support—either pipe or post—without any bolt, screw or rivet through face of sign. Will also exhibit new railroad crossing signs conforming to New York State law.

STRAUSS & BUGELEISEN, New York D-2

In charge of special staff in addition to regular selling force, under probable leadership of E. Bugeleisen.

Promise an interesting and novel exhibit of their products for eye protection. Demonstrations are planned that are said will "convince even the most skeptical."

And attending engineers are warned they "will not very well want to miss this booth."

STRONG, KENNARD & NUTT CO., Cleveland B-1, 3 & 5

Represented by Geo. S. Strong, Pres.; F. C. Kennard, Vice Pres. and Treas.; B. W. Nutt, Sec.; Thos. P. Scully, Geo. Haberacker, Nelt Barr and H. L. Wood.

The exhibit promises to be most varied and instructive, containing safety supplies and devices such as: Aprons, belt shifters, bulletin boards, carboy inclinators, non-explosive cans, safety clothing, drinking fountains, fire extinguishers, first-aid equipment and

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supplies, goggles, gloves and mittens, helmets for sand blast or welding, hospital furniture and supplies, safety ladder shoes, machine guards, masks, leg and foot protectors, playground equipment, shaft oilers, etc.

SURTY GUARD CO., Inc., Chicago D-5

Messrs. H. W. Beegle and Roland Jones in attendance.

The chief feature of this exhibit will be a cone belt shifter, but there will also be shown a large number of safety devices that have been approved by the Underwriters' Laboratories and which bear the label of approval.

THOMPSON ELECTRIC CO., Cleveland D-6

Mr. A. J. Thompson in charge.

Exhibit will comprise samples of Thompson safety disconnecting hangers for large industrial lamps, some of which will be mounted on a rack to illustrate the method of operation. Photographs of various models and installations will be shown.

TRUMBULL ELECTRIC CO., Plainville, Conn. C-3

Messrs. J. R. Dudley and McWilliams in attendance.

Fourteen different safety switches will be shown. There will be a dead front panel and cabinet with both light-duty switch and one with the toggle switch heavy-duty type.

The No. 13914 switch will be mounted on a rigid frame so that it may be easily operated for demonstration.

UNITY SANITARY CORP., Pittsburgh A-3

Represented by Messrs. H. G. Taubman and Eros.

Will show an installation of a liquid soap apparatus on a pipe line system, also a wide variety of sanitary supplies and specialties.

WEST DISINFECTING CO., New York B-18

Represented by R. M. Fort, District Mgr., and G. I.. Williams.

Will display disinfectants, liquid soaps, paper towels, liquid soap dispensers and sanitary appliances.

WESTINGHOUSE ELECTRIC MFG. CO., East Pittsburgh, Pa. B-15 & 17

Mr. W. G. Mayer, Supervisor of Safety Appliances, in charge; Mr. C. B. Auel, Director of Standards, Processes and Materials, will be also in attendance.

The exhibit will consist of actual safety devices or models designed by men in our organization for use in our works for the guarding of tools and equipment in various parts of the shops, including such items as rip and cross cut saw guards, punch press guards, safety tongs, cable connectors, acid jugs, screw drivers, ladles, belts, vacuum lifters and pickers for punched sheet metal, glass lamp reflector guards, floor mats, locking devices for belt shifters, milling cutter guards, low head room elevator gates and other devices of a similar nature.

Certain products which contain safety features will also be exhibited, among the mbeing arc welding helmets and shields, elevator safety devices, auto lock switches, motor starting switches, multiple circuit safety lighting panels, safety car panels, safety platform panels, auto starters and other similar products.

T. A. WILLSON & CO., Inc., Reading, Pa. C-6

Represented by Messrs. B. T. Roberts, F. S. Boorman, T. A. Willson and F. M. Rockwell.

Intend to exhibit latest Willson designs of safety goggles for workers engaged in the occupations liable to the three classes of eye hazards—flying fragments, flying particles, and intense radiant energy. In other words, goggles for chippers, riveters, rivet-cutters, machinists, grinders, polishers, mixers, furnace-men, welders, etc.

MAX WOCHER & SON CO., Cincinnati A-13

Mr. Max Schmidt, in charge.

Will display a safety first equipment consisting of sanitary furniture for the treatment of diseases of the eye, ear, nose, and throat; also for the treatment of wounds, accidents, etc.

As we go to press we are informed by those in charge of the exposition that additional spaces have been created in the gallery of the armory. We regret that these exhibitors cannot be mentioned as in the foregoing, but their names have not all been given to us.

We have telegraphic information that the Fyr Fyter Company of Dayton, Ohio, will occupy space G-8 in the balcony with an exhibit of fire extinguishers and that the Frank S. Betz Company of Hammond, Ind., will be in balcony space G-17 with its first aid equipment.

There will be others, undoubtedly. Be sure to visit the gallery.

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The Menace of the Rat

By C. E. Worthington

With Illustrations by Miss Gertrude M. Worthington

OUT of Asia came the Huns, a resistless horde, swimming rivers, swarming across the mountains, repulsive to the sight, abhorrent in their ways of life, vile of thought and viler of deed, sparing nothing of use to them and defiling what they could not use.

Out of Asia came the brown rat, like the Hun in vast migrating hordes, swimming broad rivers, even as the Hun swam them—fierce, relentless hordes, devastating, repulsive to the sight and filthy and abhorent in their ways, despoiling so far as they might despoil, and defiling and contaminating still more. Thus over the Volga came the Prussian of the animal world to Europe.

All other animals that have attached themselves to man have done so with his consent and aid, but not so the rat. Always hated, even feared, always recognized and pursued as an enemy, he has followed civilized man to the ends of the earth, and wherever civilized man is established, there also is the rat; even where man was the rat is.

Gifted by nature with an ability to modify and adjust his habits to varying climates and conditions surpassing that of any other animal, man not excepted; of exceptional intelligence and able to match his cunning against that of his wisest enemies; courageous, often fierce; hardy and of astonishing fecundity, the rat stands today the most dangerous animal enemy of mankind.

HIS HISTORY

The first authentic historical mention of the brown rat (known also as the Norway rat, because of the incorrect tradition of its introduction into Britain by way of Norwegian ships) was its advent in immense hordes on the banks of the Volga in 1727, and its introduction into England very shortly afterward, coming probably on ships from the far East. Swimming the river the rats dispersed themselves at once over the surrounding country, seeking by preference the abodes of men, and from there in less than 200 years have spread to every portion of the known globe, even into polar lands.

HIS HABITS

The brown rat is a rodent or gnawing animal, primarily a vegetarian, but with an acquired carniverous tendency to a greater extent than other rodents. Other animals of this rodent group have become local pests, like the rabbits in Australia, and prairie dogs and red squirrels in the United States, but the area of their depredations is in each case limited.

He is a short furred animal with a naked, scaly tail, averaging, when fully grown, about 16 inches in length, but at times reaching 20 inches. They breed about 4 times a year, producing from 10 to 20 in a litter, beginning to breed when 6 months old. At the breeding time, they build large, warm nests of fibrous material—probably in the original wild state in clumps of grass—but preferring the hollow walls of homes as affording additional warmth, shelter and security. It is easy to see how, despite their many active enemies, the increase is almost beyond comprehension.

The readiness with which new habits are formed when affording security may be illustrated by the Hawaiian brown rat. There the animal became so destructive to the sugar crop that the planters introduced the mongoose as an antidote. This plan succeeded well at first but strangely, when pursued on the ground and threatened with extinction, the rats took to nesting in the tops of tall trees where the mongoose, which cannot climb, was unable to follow, so that at the present time the Hawaiian rats lead almost as completely an arboreal

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existence as the squirrels of temperate latitudes.

They have acquired the ability to exist and multiply in sewers and under wharves and sidewalks; in other instances they have learned to burrow and construct underground nests; in others they have taken to the open fields and build in clumps of grass and rubbish heaps, and in fact there seems no condition they are unable to adapt themselves to.

This versatility extends to their food; normally probably feeders upon roots, with occasional small birds or the eggs of ground birds for variety, they have become omnivorous and have learned to feed equally on the choicest of grains and fruit, the waste matter in sewers and putrid meat and the offal of slaughter houses. In the cities they have become chiefly scavengers; in the country they are destructive, not only to grain but to poultry of all sorts, having an especial fondness for eggs, but not at all disdaining young chickens or turkeys.

Exactly as their invasion of Europe was in the form of a countless migrating army, so shortage of food induces similar migrations in mass. A good many such are recorded both in Europe and America. On these occasions they swim swift and broad rivers without hesitation, and no barrier may arrest their progress.

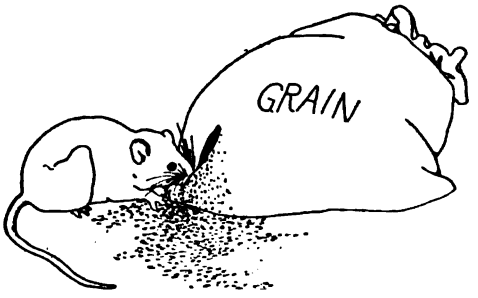
THE VANGUARD OF FAMINE

America has been and is the land of plenty and of waste—we have had enough and to spare, after we had fed ourselves and our cattle and the stranger within our gates and supplied the foreign demand, to feed the millions of rats and take little note of the loss.

Now that we must conserve our resources, how shall we best measure and abate the evil that has grown so insidiously?

A conservative writer (E. T. Meredith in *Successful Farming*) puts the value of food consumed annually by each individual rat at $2.00. This is by no means the highest estimate and, if it is taken to include what is contaminated or destroyed, may not be greatly excessive, but, be that as it may, if we should reduce it and take but 10 per cent, or 20 cents, as the annual cost per rat, the net result would be staggering, when the lowest possible estimate of the rat population is taken.

The British Government estimates the loss of food in England by rat depredations, outside of and excluding all cities, at £73,000,000 annually, and despite all ordinary efforts, increasing.



Vanguard of Famine

There are no available American estimates of statistical value, that is to say, official compilations, but it is well within bounds to estimate the destruction in the United States alone in one season as far exceeding the value of all food destroyed by the German submarines in four years of war, enough, if completely conserved, to modify greatly, if not remove, all shortage.

If there is doubt of this, consider the numbers. On one rice plantation in Georgia, in one season, 30,000 were destroyed, and on one farm in Illinois, in one month, 3,435 were killed, and in neither case were they eliminated, nor is it unlikely that the record of a two weeks' campaign in Paris, when over 600,000 were taken, could be more than duplicated in some of our American cities; at least anti-rat campaigns in New Orleans and San Francisco suggest that probability.

The margin of food supply, as between plenty and famine, is never great, and even one year of poor crops (not failure of crops, by any means, but merely deficiency) produces stringency and hardship, and with all our boasted civilization, famine is never out of hailing distance.

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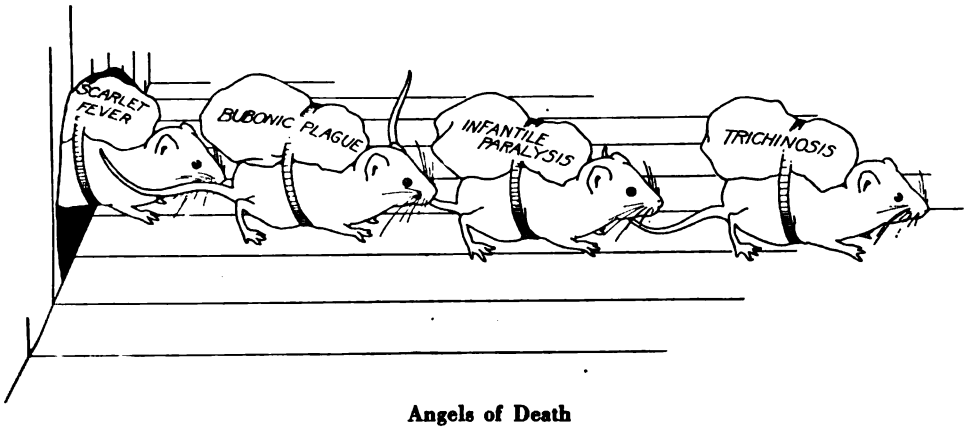


Angels of Death

THE ANGEL OF DEATH

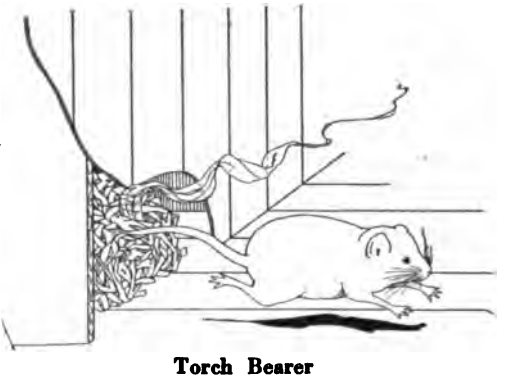
The dreaded bubonic plague is disseminated wholly by the rat and by no other means; that is, the vehicle is the rat flea which is parasitic to the rat and attached to that animal only. (Prior to the advent of the brown rat in Europe the native rats were the carriers.) In the earlier occurrences of this rat-borne disease in Europe, two-thirds of the population are said to have succumbed in a single epidemic (over 25,000,000) and the total mounts quickly into billions when the record of a considerable period is considered. Compared with these, deaths by war and violence fade into insignificance. This pestilence walks hand in hand with famine.

The plague is not the only gift the rat brings; trichinosis is his own also, the spread of which so seriously endangers life and so materially reduces our supply of animal food. If we could eliminate trichinosis we would so greatly increase our supply of pork as to overcome all shortage in supply, but before we can do that we must first destroy the rat. Scarlet fever, typhoid, diphtheria and many other infectious diseases owe their spread largely to the activities of rats.

THE TORCH BEARER

Less is known of the actual results of the rats' incendiary efforts than of those of his other activities, mainly because the resulting fire usually obliterates all specific traces of its origin.

We know that the animals find entrance to the best constructed of our storehouses, hiding behind boxes and bales of merchandise and nesting in obscure or neglected corners or rubbish heaps, and so brief is the period of gestation that a few weeks of neglect affords ample opportunity to bring forth and mature the brood.



Torch Bearer

We have in the main built our houses to shelter the rats, preferring the risk of disease and death, too frequently realized, and the constant expense and annoyance, to the comparatively trivial expense of prevention, "saving at the spigot and wasting at the bung." Our corn cribs, elevators and barns are veritable "cities of refuge," as indeed are many of our houses, our sewers and often sidewalks.

Into the safety of inaccessible, partly

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enclosed spaces, open channels of joints and studding cocklofts, hollow spaces under ground floors and especially the warm, comfortable areas about chimneys penetrates the rat, and to these places he drags the material for his nests—rags, oily or clean, greasy paper, straw; litter of all sorts, especially fibrous litter, is accumulated, sometimes by tons, and the use of shavings and the like left in these spaces by the carpenters is not forgotten. I have stood on the floor of a great mill, full of whirring wheels and swift belts and clanking machines, with hundreds of men and women at work, and have seen rats dart out, fairly between the feet of the operatives, to secure and drag away a handful of oily waste dropped even momentarily upon the floor.

In demolishing buildings, especially such as have been used for textile working, tailor shops and the like, it is by no means unusual to remove many wagon loads of accumulated fiber and rubbish forming the nests, especially from about the chimneys.

Occasionally the fire is extinguished in time to find the partly consumed nests, and occasionally underdone or overdone rats in them, but more frequently the destruction is too complete.

Of the thousands of fires of "unknown" origin having their beginning in the walls, attics or ceilings, probably 90 per cent are due to the material accumulated by the rats—mainly by spontaneous ignition. A very large, though unknown, proportion of fires set down to "defective chimneys or flues" is doubtless due to the same cause, the vast majority of these cases failing to disclose, where examination is practicable, any visible chimney defect. Many "incendiary" fires are probably the work of rats.

Rats do not, so far as can be ascertained, gnaw or ignite matches, they may have done so to some extent in past times when yellow phosphorus (the use of which is now forbidden) entered into the making. This form of phosphorus is not distasteful to rats; in fact it is used in many "rat pastes" and apparently liked, but under no conditions of starvation can a rat be induced to partake of the form of phosphorus now used. Experiments repeatedly made appear to have demonstrated this fully.

On the other hand the match is of convenient size and shape for material for nest building, and matches ignite at a comparatively low temperature, and the mere heating of the accumulated rubbish which forms a nest would be sufficient to produce fire by that means, although if the match was not present the heat might never reach the point of combustion.

So thoroughly dried do these nests become when resting against or near chimneys that the least spark escaping from a loose or decayed funnel will suffice to start a blaze; sparks would fall and expire harmlessly upon almost any other material than these accumulations of veritable tinder.

So numerous are the opportunities and so ever present the hazard that in all probability the list of fires now attributed to "rats and matches" or "rats' nests" should be augmented by a very large percentage of those classed as of "unknown origin" and a very considerable proportion of those attributed to "defective chimneys" or "defective flues," ignoring another considerable proportion of the latter where the "defect" is a remote or contributory cause, only since it could not reasonably be expected to be effective in any material proportion of instances.

OCCASIONAL DISCOVERY OF ELECTROCUTED RATS

The use of electricity and wires run exposed between ceilings offers another opportunity. Much of the insulating material is palatable to the rat, whose taste when he is hungry is not at all discriminating. Gnawed insulation and short circuits consequent upon it may be more numerous than is suspected. At least the occasional discovery of electrocuted rats suggests such a possibility, and the cases are not extremely unusual where the "defective insulation" cannot be explained so plausibly on any other supposition.

Apparently the rat has by no means received even a modicum of the credit due him for successful incendiarism although it must be confessed that in the

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Electrocuted Rat. The rat gnawed away insulation on telephone wires and caused short-circuit which killed him. If current had been of higher voltage a bad fire might have occurred

main the conclusion rests in part upon what the legal fraternity call "sole opportunity."

HIS NATURAL ENEMIES

Eliminating man, the rat's path in life is beset with perils that call for a very high degree of intelligence and cunning to elude them.

Dogs of certain breeds are implacable enemies, and woe to the rat caught by them too far from a safe haven of refuge. Cats have a natural antipathy to all rodents that are not too large and powerful for them to attack, such as mice, squirrels, rabbits and rats. A full grown rat is, however, a formidable antagonist, and many cats fear them and shun them. But the majority will attack those partly grown, while avoiding the full grown ones.

Outside the cities the natural enemies are more numerous. Weasels and most of the smaller carnivorous animals will attack and overcome them, but weasels come under the human ban, being, almost as much as the rat, destroyers of eggs and young chickens, and are too rare to exert much repressive influence.

The same is true of the great horned owl, the only owl that dares face a grown rat, and of the larger hawks (the smaller hawks are not strong enough). All of these hawks are not injurious to man or poultry, but seldom do the beneficial ones receive discrimination from man.

The bull snake (known also as the "chicken snake," probably because he is never known to molest chickens) is an exceedingly efficient destroyer. Such snakes occasionally take up their abode in houses that are infested, and because of their ability to follow the pathways to the nests do much good work. Their fondness for young rats as an article of diet is a recommendation. But, alas, a ban rests on all snakes, good and bad, and the bull snake likes eggs, so he receives little protection, although deserving much.

All of these, in the aggregate, destroy great numbers, but since in turn some are themselves "pests" they merely serve slightly to limit the increase and it is evident that we may not place very much reliance upon any aid from natural enemies.

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WHAT CAN BE DONE

The necessity of more persistent and more fully organized effort for rat destruction is evident, since the situation grows always more serious with the continued increase.

Cats we have and generally encourage, although at present a campaign is being waged against them, based upon their bird-killing propensities. They certainly are of much value, so far as combating the rat pest is concerned, and the wisdom of restricting them is very doubtful.

The value of the dog, as well as his limitations, is well known, and little may be said in that respect. Ferrets and others of the weasel tribe cannot be bred and run at large, and their use is restricted to such conditions as enable them to be utilized as adjuncts to dogs.

The most destructive and effective enemy of the rat is that curious oriental beast, the mongoose, but once his enemy is displaced he speedily becomes such a pest that the remedy is about as bad as the disease.

Evidently animal aid to a very great extent, at least to an extent that will overcome rat increase, is impracticable. Not that the valuable aid of dogs and cats, especially cats, is to be in the least belittled or denied but it is not of itself sufficient.

EXCLUSION

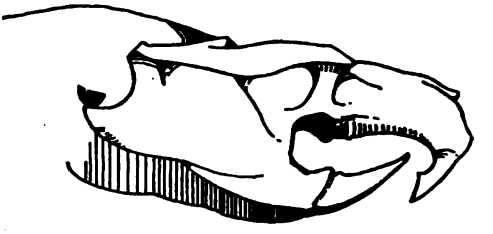
Naturally the first step is to keep the enemy out of the places where their presence causes most harm by placing our houses and other buildings in a state of defence.

A completely fire resistive building is also rat resistive, the two qualities going hand in hand, and while they are not entirely synonymous, about everything that can be done in structural rat-proofing is of considerable effect in fire resistance.

But in general our buildings are not of that sort. Not only are the majority built to burn as quickly and easily as possible, especially dwellings, but if many buildings had been planned especially with a view to affording shelter and safe breeding places for rats they could hardly have been made to meet the requirements to that end more completely than they do.

Our friend, Mr. Rattus Norvegicus, to give him his full name, can do a great deal of mischief, even to gnawing holes in lead water pipes, but fortunately for us there is one thing he cannot do, otherwise his destructiveness would be increased tenfold at least.

Notice the outlines of the cut below.



Skull of Brown Rat

The gnawing is done by the two chisel-like teeth in the upper jaw, which incline backward at a considerable angle, so much so as to make it almost, if not quite, impossible for him to attack a plane surface. In fact a rat may be as securely imprisoned in a pasteboard box as in a steel cage, provided the sides are stiff and strong enough to resist the thrusts of his powerful body. In this lies our main defence.

One favorite breeding place is in the channels of the joists above ceilings and between the studding back of the finish, to which entrance as a general rule is had within 10 or 12 inches of the base, the initial opportunity for making a sufficient opening being provided by a decayed board, a knot hole or even the exposed edge of a baseboard.

To keep him out at this point is fairly simple, if the spaces between studs are "nogged," that is, filled in with brick to a height of 12 inches above the floor. Six courses of brick will do it at that point. Light concrete will do as well, provided it is fairly well seasoned with broken glass, the only valid objection to the method being that it may in some cases accelerate decay of woodwork.

Access, however, is not entirely confined to this point. Shelving and furniture are necessities, and openings are likely to occur several feet above the floor and often in obscure places not easily examined or reached. If the wall at the floor is firestopped with brick and

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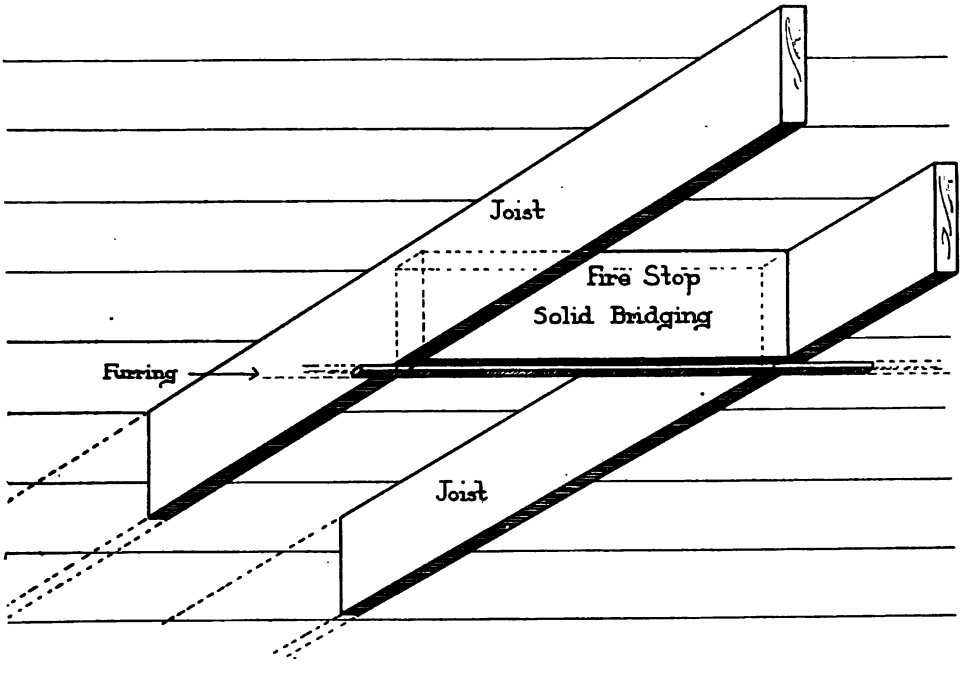
the bricks are properly set in flat and parallel to the joists and project several inches beyond the girt, an obstacle is provided which reduces the trouble to a minimum, but although that is the way in which firestops are intended to be put in, they are rarely put in that way and, as ordinarily laid, there is often easy passage from between studs to the joist channels from floor to floor.

pense, or very little, provided no exposed edges are permitted where furring strips are used.

It is of course necessary to cut in furring strips flush with bottom of joist or fill in between them, which constitutes the only extra expense, and that only in case of use of furring. This does not apply to lath laid direct on joists.

Perhaps the chief objection to this is



Solid Bridging—Fire Stop and Rat Stop

Stops between studs made of joist ends and set in at intervals of about 4 feet, say two to a story between all uprights, are effective if there are no knot holes in them, or "faults" in the stops or studding deep enough to let a nose be pushed far enough in to let the chisels operate.

Entrance to joist channels is obtainable in many possible ways besides climbing up between studding (the rat has developed extraordinary climbing abilities for an animal naturally belonging on the ground).

The use of joist ends in place of strip bridging is the logical remedy; this involves, like the stops, practically no ex-

that it somewhat abridges the carpenter's perquisites by cutting off a part of the waste he takes as his due. The value of these stops as fire protection is quite apparent since they serve equally to stop draft.

These in neither case are complete protection but they limit the area of the trouble so that it can be treated and dealt with effectively. In business buildings and in fact anywhere, metal trim is a valuable aid, even if this is limited to baseboards and corner strips.

If there is no finish about the chimney below the first floor, there is slight opportunity of access via the necessary ventilating space.

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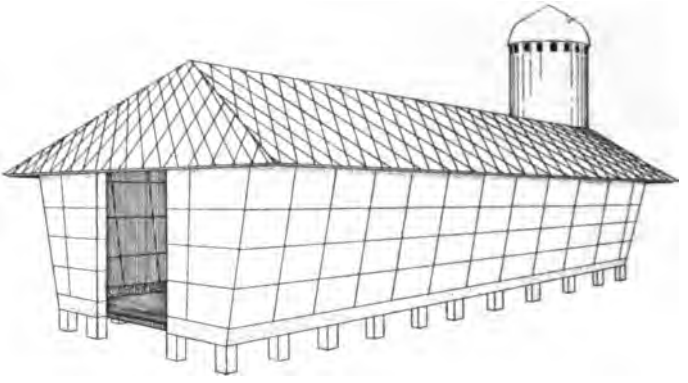
Shelving and the like, if backed, should be set up with the back in contact with the wall at all points, rebating the sides at the bottom to provide for the baseboard and every effort made to avoid creating semi-enclosed spaces, to which any access can be had except by visible means.



After Illustration in "Successful Farming," Des Moines

Rat Proof Cornerib

With these precautions there should be little chance of access to the closed spaces (cocklofts, joist and stud channels and the like), especially if solid brick or concrete foundation or basement walls are carried 18 inches or more above ground, but their application is almost solely to new construction.

In the country, aside from dwellings, the chief structures to be defended are corn cribs and silos. Inverted pans on the supporting posts of corn cribs are only partially effective and the only practical method is a completely rat-proof structure (which incidentally is a fireproof one, or nearly so).

It is here in storage in unprotected temporary cribs, that perhaps one of the heaviest items of loss is sustained. The matter is receiving some, but not enough, attention.

One writer upon the subject in a farm journal aptly states the case from one viewpoint: "Such methods were possibly excusable in the days of 15 and 20 cent corn, when it was questionable whether a crib would save enough from rats, mice and weather to justify its cost," but those days are gone, never to return within the lifetime of any now alive.

The article (*Successful Farming*, Des Moines, Ia., August, 1918, page 14) should be read by every farmer in every State and territory, and reprinted in every periodical. In it the plans are given for a completely fire and rat-resistive crib of tile and wire, costing but little more than wood to construct, permanent, and practically certain to save each year by preserving its contents intact far more than the initial excess of cost. The external appearance is indicated by the cut above, reproduced from the publication named.

The same remarks apply to silos, the loss in these at the present time passing many millions of dollars annually. There are, unfortunately, certain classes of establishments where safeguards that are effective are too costly or inconvenient to be entirely practicable, and in these, as in existing buildings of inferior construction, other methods must be resorted to.

DESTRUCTION

Of available agencies the most efficient is the cat, whose antipathy and enmity is ineradicable. True the rat has other and fiercer enemies among the smaller carnivora, about all of whom appear to cherish an undying hatred, but the cat alone is a friend of man and tolerable about our dwellings.

Cats do not hunt rats for food. In fact they often refuse even partially to eat them, and well-cared-for cats, not being compelled to divide their time between seeking food and attacking their enemies, are the most efficient. So efficient are they, that when we consider what might be were the increase of the pest unchecked, we wonder less that rat-devastated, famine-cursed Egypt deified its feline rescuers and gave them costly tombs. To the Egyptians the cat was a gift of heaven.

True, cats catch and eat some birds, but city cats get mostly English sparrows

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and starlings, to which they are more than welcome; country cats get a good many birds on the ground but they also get red squirrels, and the cat that has destroyed one litter of red squirrels has more than squared accounts and has in the end been a saver of bird life. This is aside from the fact that a considerable part of the crimes against birds charged to cats are based on suspicion merely and are very largely the result of the activities of other creatures. Dogs of certain breeds do considerable good and are in a certain measure useful, especially when used in conjunction with ferrets.

Poison can be used to much advantage, although the rat, both wise and wary, is inclined to refuse the most tempting bait if it carries human odor. In using poison do not touch or handle it or any material upon which it is spread; use some implement thoroughly sterilized in boiling water to remove all scent, and constantly vary the method of displaying the bait. Dry plaster of paris mixed thoroughly with about twice its bulk of dry corn meal is effective, for a time, as are all of the poisons sold for the purpose, if used with due caution.

Traps are harder to utilize. The favorite is the wire "catch 'em alive." Steel spring traps, well concealed, do well for a period, and the glass trap sold in the department stores is pretty sure sooner or later to secure the wisest and most cautious rat, but no trap should be handled with bare hands if the greatest efficiency is desired, always with gloves, especially gloves rubbed with a little fish oil—rancid fish oil is best. The tilting trap, consisting of a tilting board above a cask of water, does excellent execution. A method said to be very effective about barns and outbuildings and in fields is to locate all entrances and exits of the holes and stop all but one, into this one connecting the exhaust of an automobile by a length of hose. Carbon monoxide does the work and no rat survives, but carbon monoxide mixed with air is explosive, and some caution is necessary.

Use them all, cats, dogs, poisons and traps, but take care not to trap or poison the cats and dogs.

Stop every rat hole in walls, using metal or plaster of paris well mixed with broken glass, or good cement, stopping all of the several exits if they can be found (the holes or dens usually have several—2 to 4). Starvation is a good adjunct. Destroy all rubbish piles.

Now that the Government has become aroused and is planning campaigns, perhaps some means will be found to flood the sewers with poisonous gases and so destroy millions.

But even then there are so many inaccessible places or places difficult to discover, not to mention the open fields, that at best a check is all that can be hoped for; extermination is probably impossible.

Fire, Disease, Famine, the three greatest enemies of human progress, safety and comfort, all are part of the menace of the rat, and the menace is with us, never to depart wholly, although by constant vigilance and unceasing warfare we may save as the years go by, billions of dollars of food, thousands of buildings, and many millions of human lives.

But the effort should be concerted and continuous, not a few sporadic or scattered raids, but a permanent sustained effort by Governments, local and general, as well as by individuals. Different estimates set the loss from rats alone of our entire crop of cereals at from 4 to 12 per cent, but even accepting the lowest of these, the continued loss is intolerable.

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Experiments with the Tissot Gas Mask

By J. D. James

Safety Inspector, The New Jersey Zinc Company, Palmerton, Pa.

"THE Tissot type of gas mask is recommended for use in a large number of different kinds of gases, but is not recommended as a protection against carbon monoxide gas, and must not be used around blast furnaces, gas producers, illuminating or natural gas, nor coal mines after explosions or fires, as carbon monoxide is a constituent of the gases present in these places."

The safety department of the New Jersey Zinc Company (of Pennsylvania) noticed an advertisement of the Akron Tissot Gas Mask, size No. 3; one was bought to experiment with, and as it gave no protection against carbon monoxide gas, some changes had to be made in order to get protection from that gas, which is so prevalent around blast furnaces, gas producers, etc.

Fig. 1. Man fully equipped with Improved Tissot Mask ready for action in any poisonous gas

The canister, which contained a mixture of absorbent material as protection against certain gases used in warfare, was removed from the flexible rubber tube and replaced by a ¾" brass hose coupling. Another half of the coupling with union was connected to 50 feet of ¾" rubber hose. On the other end of the hose a funnel was fitted with a 6" diameter at the larger end tapering down to make a connection with the ¾" hose. At the small end of the funnel, a flutter valve and strainer was placed. The reason for this arrangement is so the funnel can be placed away from the gaseous atmosphere and, if possible, in the opposite direction of the wind. This will permit the man using the mask to breathe a sufficient supply of fresh air to do any kind of necessary work around blast furnaces, gas producers, or any other place where men are affected by carbon monoxide gas.

The masks connected up as mentioned above have been thoroughly tried out at the blast furnaces and gas producers of the New Jersey Zinc Company plant at Palmerton, with good results. One

Fig. 2. Man tightening gas slide joint with Improved Tissot Mask showing air line

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of the tests was to throw a 3-foot slide damper on the main gas line where 36 ¾" bolts had to be removed before the slide could be opened to clean out the gas line. After cleaning the gas line the slide was closed and the 36 ¾" bolts replaced, tightened, and the joints sealed all around with clay. This test was made by two men who were enveloped with carbon monoxide about 45 minutes. After the job was completed, both men claimed that they were not affected in the least with gas, and continued their regular routine of work. Several tests have been made with the same very gratifying results.

The old way of turning these slide dampers always took at least 6 men working in pairs, each pair working at alternate periods, often only a few minutes each, and usually taking about one and one-half hours to do the job. Quite frequently some of the men were overcome with the gas, necessitating artificial resuscitation to relieve their condition.

The strongest argument in favor of this gas mask is that the men will not do this work now without this mask.

Our object in writing this short article describing our experience and showing what protection our men have by wearing the Tissot Improved Gas Mask with the suggested changes against one of the most dangerous gases in industries

Fig. 3. Showing condition of Carbon Monoxide Gas where men have to work while changing gas slide dampers

Fig. 4. Showing condition of Carbon Monoxide Gas where men have to work while changing gas slide dampers

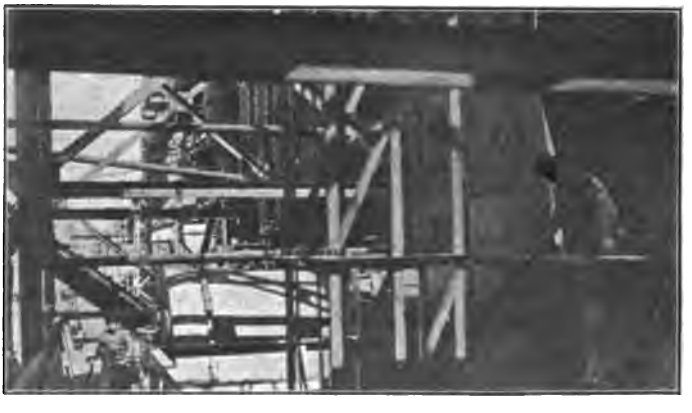

Fig. 5. Man tightening gas slide joint with Improved Tissot Mask showing air hose and funnel

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all over the country is that through SAFETY ENGINEERING we may do the most good to the greatest number. We fully believe that all safety engineers and inspectors should co-operate in this work, and when one engineer discovers, invents or designs a safety appliance that may prevent an accident and thereby alleviate any suffering of humanity, he should proclaim it from the housetops, so that all may take advantage of the appliance, thus helping to make all industrial plants as safe as possible, which will result in the reduction of the number of accidents and the misery and suffering that often follows.

The Safety Department of the New Jersey Zinc Company (of Pa.) has for a number of years given deep thought and study to the hazard of the poisonous carbon monoxide gas and has tried all known breathing apparatus without success, until we improved the Akron Tissot Gas Mask. We are very happy to have at last found a way to protect our men when it is necessary for them to work in an atmosphere saturated with carbon monoxide or any other poisonous gas.

Safety Work on Railroads

By Charles W. Gregg

Regional Supervisor of Safety, Pocahontas Region, United States Railroad Administration

AFTER the Safety Section was authorized by the Director General of Railroads, there was a questionnaire sent out early last year, addressed to all of the railroads under Federal control, asking for information about the safety work and methods. And it was interesting to see the meager details some of the roads with much-vaunted "Safety First" departments sent in.

Some sent in data of past performances, with no present activities, giving as an excuse "pressure of business." It is now most encouraging to see the awakened and accepted responsibility under the direction of the Safety Section, and many of the officials and employes who were still in the thought of the link-and-pin and hand-brake age of the nineteenth century—the attitude of "let well enough alone"—have been converted and have become twentieth century advocates of safer conditions and practices. By the enforcement records and statistics asked for by this section, they can now by comparisons see the wisdom of comparative records showing progress or a backward movement; if progress, to show it worth while and actual profit; if backward, to show the great loss and to stimulate an endeavor to remedy the cause.

When making a vigorous campaign for safety about three years ago, specially dealing with the trespassing on railroad tracks by employes of large industrial plants adjacent to the right of way, it was my custom to first interview the manager of the plant and call his attention to the unnecessary hazard and ask for co-operation in notifying and educating the employes by placards and bulletins of the danger. In that State it is against the law, subject to fine and imprisonment, for people to trespass—walk on the tracks. A manager of one large plant employing 2,000 men said that he would gladly co-operate and he hoped actual arrests would be made as a more vigorous reminder than his oft-repeated words of warning, for he had seen some of his valued employes, even superintendents of departments, on the tracks, men he had trained for 15 years in intricate specialized manufacturing, and who are now performing most acceptable services. If any one of these men, daily taking chances on high speed tracks, were killed, he did not know where he could get another equally trained and efficient employe to take his place. In other words, his live employes were actual personal assets of more recognized worth than the employes considered themselves to be to their own families and dependents.

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It Is "Tempting Providence"

Courtesy of Boston Post

A Man-Trap Garage-Dormitory in New Hampshire

STUDY this picture well. The first story has stone walls and a ceiling of flat tile arches. It is fire resistive, but note how the tall windows reach up behind the sloping eaves of the huge 2½-story, light frame, shingle-covered gambrel that surmounts it and the great wooden awning at the end.

No, it is not a summer hotel. We would look upon it as a "man trap" despite any degree of care and watching and an abundance of first aid appliances. It is a garage, intended to accommodate 100 touring cars on the main floor, without crowding unduly, and provide sleeping, eating and living quarters for the hundred chauffeurs and the attendants (possibly 200 in all) in the great pine, shingle-covered shell that towers above it.

One hundred touring cars mean a conservative average of 1,000 gallons of gasoline in the reservoirs and many thousands of square feet of under surface interlaced by oil dripping machinery and close to the floor.

And here, underneath these hundreds of sleeping men and women, will lie this potential volcano, ready on the slightest provocation to transform itself into a raging inferno, without a single instant of delay. A chance spark struck on the concrete floor, a crossed wire, an unextinguished cigarette, a stray match, back-fire of an incoming car, or any one of the hundred other possible accidents, and in less time than it takes to tell the story the leaping flames have filled the entire area.

There is no absorption of heat in walls and ceiling; no outlet except by doors and windows, and no one who has ever seen a fire of this nature will forget the violence, the blow pipe effect, of the issuing flames or the intensity of the heat due to rapid combustion.

Even the tile-arched floor is endangered in its stability by the great area, and wireglass, that ever efficient protector, endures but a moment in a melting temperature; and, with the eaves and sloping shingled surfaces once aflame,

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what hope for the structure or for the inmates slow in exit?

Where there are definite restrictive ordinances *all* portions of a garage are required to be of the highest fire-resisting grade of materials, and occupancy of the upper floors for habitation is usually completely forbidden, but no ordinance has contemplated the possible project of what is virtually a huge hotel of light frame perched directly above a hundred-car garage, whatever the garage construction.

And in a summer resort, without disciplined police and fire protection from well organized and disciplined departments, the situation is aggravated. It looks like preparing the way for a possible holocaust to shock the country and rank with the Iroquois Theater and the Triangle Waist Company fires.

The owner is a man of millions, a former large employer of labor, whose factory was safeguarded by every appliance, with or without his personal knowledge.

But men do not think in all directions. A man may direct enormous enterprises with success, and understand to the minutest detail every intricacy of his own business, may be a world figure in public spirit and philanthropy, and yet unable to define an anarchist, or he may maintain conscientiously ideas totally at variance with the theories and experience of the rest of the world, with unshaken faith in their accuracy, and in the absence of this codification of common sense and experience which applies force to compel conformity, and which we call law, we may only attack the act and leave the actor to the workings of his own conscience.

But, nevertheless, such construction as this can only be viewed in the light of preparation for an appalling disaster, of smoothing the way for calamity and relying for immunity on the slender hope that something will not occur that is more than likely to occur.

Foundrymen Take Warning

Why Wear Poor and Unsafe Shoes Like These?

←

And Have to Endure the Torture of a Frightful Burn Like This?

↓

Wide-awake, Careful Foundrymen Wear Shoes That Are Specially Made for Their Work Like These.

←

Ford Motor Company

YOU MUST ACT NOW BEFORE IT IS TOO LATE

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EDITORIAL

THE OPPORTUNITIES AT CLEVELAND

THE National Safety Council urges the attendance of safety engineers at the Annual Safety Congress in Cleveland—a wise and timely suggestion. The engineer's job is to make industrial operations as safe as possible by engineering methods. His sphere is not described by the title "safety director" or "safety manager." His place is not the safety pulpit but wherever the machines are running and wherever workmen and workwomen "live, move and have their being" during the hours of labor. While there must be no let up in the effort to get every individual workman to "think safety" there must likewise be no lack of attention to the proper layout of factories, to the guarding of men and machines in all possible ways, to lighting and ventilation systems, to sanitation, to exit facilities in case of fire, etc. Therefore, the safety engineers who visit Cleveland will find much to interest them in the safety exposition in the Grays' Armory.

"NO ACCIDENT WEEK" IN JAPAN

一第全安

THIS is the Japanese expression for "Safety First," and the safety movement in the island kingdom is likely to make headway, under the capable direction of Mr. K. Uchida, despite the ludicrous results of the first "'Safety First' Week" in Nippon, as related in recent press dispatches from Tokio. Mr. Uchida has promised to prepare an article for SAFETY ENGINEERING on safety work in the industries of Japan, which our readers will receive in due season.

The dispatches referred to, dated August 27, tell us that June 15-22 was "No Accident Week" in Japan, but obviously something went wrong with it. Reports of the metropolitan police show that the number of accidents during the week was greater than in the corresponding week of last year.

The *Yamato*, one of the leading Tokio papers, subsequently conducted an investigation and thinks it knows how this came about:

> The idea of the thing entirely miscarried with the bulk of the people, who took the "Safety First" emblem, a green cross, to be a sacred talisman of the gods which would protect them from accidents, no matter what they did. One man restrained from jumping from a car replied that nobody need worry about him so long as he wore that badge. One accident was caused by a motor car containing officials who were overseeing the "Safety First" operations in various parts of the city. The officials drove into the forbidden, crowded part of a park at considerable speed.

We may laugh at this story, but how many American industrial managers practically begin and end their safety work with the erection of a bulletin

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board, the displaying of safety posters and similar somewhat talismanic methods and devices. The man who placards his plant with signs and signals and maintains dark passages, slippery staircases, unprotected crossings, unguarded machinery and unshielded eyes cannot claim to be far removed in thought from the man who tempted fate because he wore a Tokio safety button.

A SCORCHED OSTRICH

ALLUDING to the loss of life by fires, Insurance Commissioner Young of North Carolina, addressing the National Convention of Insurance Commissioners, said that many of the fire insurance companies feared that the force of their campaign to reduce property losses by fire would be lessened if the losses of lives by fire were mentioned by them. "There never was a greater mistake," said Commissioner Young.

In his own State fire causes 300 or more deaths every year, "but during the first three months of 1919 the average was two a day." In his campaign to secure the active aid of every man, woman and child in North Carolina to prevent fires he has found these data "a wonderful weapon to use in the warfare against fire waste."

Thus Commissioner Young is in complete accord with SAFETY ENGINEERING, which long used such influence as it possesses to induce the fire preventionists to put forth an argument for the saving of life as well as the conservation of property. We will not now say how stupidly blind fire-insurance fire preventionists have been in their failure to see this point nor how amazingly antagonistic their publicity men have been toward taking any part in the general safety movement to reduce the life waste by fire.

Fortunately they are now illumined by a light which they themselves never saw. Hence October 9 is now Fire and Accident Prevention Day, instead of merely Fire Prevention Day, owing to the co-operative spirit between the National Fire Protection Association and the National Safety Council.

The fire insurance ostrich, quite a dull bird, waits to have its plumage scorched by a spontaneous combustion in its rear before it awakens to its opportunities to serve itself by serving the people. It is usually a reluctant reformer and always a laggard in leadership.

LEAKAGE OF GASOLINE FROM TANK WAGON

To the Editor of SAFETY ENGINEERING:

SIR: In the August issue of SAFETY ENGINEERING there is a very interesting article entitled "A New Development of the Gasoline Hazard." This refers to the gradual leakage of gasoline from a tank wagon, due to the breaking off of the faucet at the base of the tank.

One paragraph states: "The protective remedy against a recurrence is not clear."

I thought it might interest you to know that it has been the practice of E. I. duPont deNemours & Co. for some years to insert in acid tanks, especially those the contents of which are drawn down into a scale tank to be weighed, an interior plug valve operating through a vertical rod and a series of levers, thus in event of leakage of the gate valve on the acid draw-off, the plug may be dropped down into the orifice of the draw-off pipe.

It would be a very inexpensive proceeding to provide tank wagons with a similar device. A spring might be also arranged so that the plug valve inside the tank would be normally closed and would be open only when drawing off gasoline.

L. A. DEBLOIS
Manager Safety Section, E. I. duPont deNemours & Co.

Wilmington, Del., August 28.

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Physical Examination Previous to Employment

By Charles F. Willis, S. B., M. E., Bisbee, Ariz.

Transactions of the American Institute of Mining and Metallurgical Engineers, Chicago, September, 1919

THE method of carrying out the physical examination by the Copper Queen answers well the arguments against such examinations. The large number of cases that come to the attention of the medical examiner are not cases of illness that require hospital or sanitarium treatment or necessitate the laying off of the man. Full preservation of the rights of the employes is maintained, and the matter of following up the results of the examination by re-examination and treatment is strictly optional with the men. The examination does not increase the authority of the employer over the workman, and except in a few cases, it has been the desire of the employe to correct physical troubles and maintain good health.

To secure privacy, the examiner's room is fitted with five private rooms, all of which open directly upon the doctor's room, but are not open to each other.

The attitude of the examiner is important. Dr. R. B. Durfee, who conducts the examinations of the Copper Queen, emphasizes the fact that the examination is made in order that the workman may have a better knowledge of his own condition. He is told of his condition as the examination progresses, wherein he can help himself, where treatment is necessary, and where changes in his living conditions would improve his health. Many of the men are given information that is invaluable to them.

During the six months' period ended June 30, 1918, the medical examiner of the Copper Queen mines examined 2,342 men, 88 of whom were rejected. Of these 88, 20 were conditionally passed by the mine superintendent and put to work. Therefore, the rejections amounted to about 30 in 1,000, as against several times that number in the army. It can be readily seen that the Copper Queen policy is not the rejection of the physically unfit, but rather the placing of men where they are best fitted and where the safety and health of their fellow employes are not impaired.

Three men were rejected for albumen; this is only in extreme cases, however. A man is usually put to work where conditions warrant treatment and cure. A careful examination is made of the heart, for this has its influence upon safety. A man suffering from a diseased heart is a menace to his fellow employes and is physically unable to carry on his work. He is likely to become unnerved if engaged in work that is full of quick surprises or excitement, the excitement itself saps his strength, interferes with his own safety and adds to the risk of others. However, only seven men were rejected for this cause. Mining is arduous work and involves much heavy lifting; therefore a careful examination is made for hernia, a serious natural weakness common in every walk of life. Thousands of people have hernia without knowing it until it becomes painfully serious or is pointed out to them. A comparatively simple operation cures the disease in a short time. Out of over 2,300 examined, 48 were found to have severe cases of hernia. Practically all of the 20 men conditionally passed by the mine superintendent were men having hernia, which was to be corrected by an operation later. A ruptured person mortgages his vitality and gambles with his life when he lifts heavy loads or even coughs violently, and he should not be placed in a position where he is liable to injure himself.

It is only in the case of active tuberculosis that rejection is made; in ordinary

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cases of lung weaknesses men are placed in out-of-door work where the danger of contagion is small and where the likelihood of cure is large. But seven men were rejected for tuberculosis. Men with this disease in an active stage are unable to do a day's work, and, what is more important, they are likely to extend the disease to other workmen when working in a confined place. The detection of weak lungs offers the doctor the opportunity to give men advice as to their methods of living, eating, etc., which will correct their condition.

But six men were turned down because of their eyes. Those with ordinarily poor eyesight are not rejected—practically every case amounts almost to blindness. It is not uncommon to find a man entirely blind in one eye without his knowing it. If eye tests had been common in industries in the workman's early life, the sight of the now useless eyes could have been saved in many cases. Occasionally cases of trachoma are found, which call for special care in order to protect other workmen from the disease.

The rejection on account of defective hearing is a matter of degree. But two men were turned down for this cause during the six months, both of whom were cases in which there would have been considerable danger to themselves.

It is not uncommon to have men making application for work who have one arm, one leg, or who have not the use of their arms or legs; and while there are occasional positions in which these men might be placed, and it is the policy to do so whenever possible, usually rejection has to be made. But one man was rejected on this account.

Men having venereal diseases in an acute and contagious state are rejected, although there was but one case of this in more than 2,300 men examined. The conditions of a mine where men are working in more or less confined quarters permits the spread of such diseases far more readily than in many other industries, and no man desires to be in direct contact with venereal diseases.

Drugs, alcoholism and morphine were responsible for the rejection of four men. Such men are dangerous to others.

Bright's disease accounted for one man, fever for three, measles for one, and teeth for one. Bad teeth lead to indigestion, which in turn clogs the mental and physical powers and makes a person stupid and inefficient. They also send germs in increased quantities to the lungs and heart, tighten joints, and cause rheumatism. Rejection is only in extreme cases, however, for this reason.

It can be seen then from the foregoing that the Copper Queen method is by no means the rejection of the unfit, but rather the rejection of those almost totally crippled and those who are a menace to their fellow employes. There can be no question of the advisability of the physical examination, whether it is considered from the humanitarian standpoint or the selfish cash-conserving standpoint. It adds to the workers' physical comfort, gives them better employment for longer periods, removes, as far as possible, danger from contagion, and improves conditions in their homes and in the community. By paying attention to physical defects in time, defects that would be overlooked if such physical examinations were not made, hundreds of employes have been refitted for work who would otherwise be jobless because partly incapacitated. Moreover, the health education imbibed by the workers extends to their families.

The fear that has been expressed that the practice of applying the rule of physical fitness will rule some men out of industry is shown, by the records of the Copper Queen, to be of little weight, because very few applicants are barred from industry because of their physical defects; and we must agree that it is good policy to quarantine out of industry a man whose physical condition carries with it a menace to his own safety and to that of those who work with him. The records show that by locating and protecting their infirmities, hundreds of defectives have been directed into safe and remunerative places in industry who otherwise would have been unable to continue at work.

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The Safety Engineer and Accident Statistics

By Albert H. Fay

Mining Engineer of the Bureau of Mines

Address at the Mine Safety Conference, Lake Superior District, Duluth, Minn.

MINING is a basic industry, the magnitude of which may be grasped when one realizes that more than 6,000 000 men are engaged in the mines in the world. Of this number 3,800,000 are employed in the coal mines and 2,200,000 in the metal mines. The importance of the mining industry of the Lake Superior district is evidenced by the fact that in 1917 there was employed in the district 29 per cent of the men engaged in the metal mining industry of the United States. In 1916 the Lake Superior district employed 27 per cent. The district produces 81 per cent of the iron ore of the United States and employs 72 per cent of the men engaged in iron mining. The Upper Peninsula produces 27 per cent of the copper of the United States and employs about 25 per cent of the men engaged in copper mining. The total number of men employed in the Lake Superior district in 1917 was 42,500 and in 1916 41,840, as compared with about 200,000 employed in the metal mines of the United States.

Mining is one of the extra-hazardous industries employing more than 1,000,000 men in the United States of which 3 or more out of every 1,000 men employed are killed each year by reason of some accident. While complete data relating to non-fatal injuries are not available, yet reports to the Bureau of Mines for all mines in the United States show that at least 250 men per 1,000 per year are injured sufficiently to cause a loss of time. Approximately the same rate will apply to other branches of the mining industry. A reduction of 50 per cent in the number of mine accidents would mean a saving of at least 1,500 lives in the United States every year, a saving of valuable time now lost and an alleviation of much suffering now resulting from more than 250,000 non-fatal injuries occurring in the mineral industries.

Considering the vastness of the mining operations of Minnesota and Michigan, the safety engineer has a large field in which to work and opportunity to accomplish results that cannot be obtained elsewhere. The progress in the Lake Superior district in the last 10 years in matters of safety and safety appliances and mine inspection is evident from the accident record and from a casual observation of the safety appliances installed. This progress is further evidenced by the large number of safety engineers employed in the mines of this district, and your interest in matters of safety is shown in the active part you take in the meetings of this character.

NEED FOR ACCIDENT STATISTICS

Before offering any suggestions as to what the safety engineer can do for accident statistics, it is well to point out some of the reasons why accident statistics are necessary. It is not to preserve a record of discomfort, pain and suffering of injured employes that statistics are collected, nor to furnish statisticians with a set of figures which may be juggled to suit any peculiar whim; and utilized for the construction of fancy charts. These, however, are necessary adjuncts to the main purpose, viz., to obtain information by which to diagnose industrial accidents in order to determine their cause and provide a remedy. In every court of justice it is necessary to have all the available evidence to identify the guilty one, in order that proper verdict may be determined and just sentences imposed. Statistical records are essential as evi-

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dence to prove the guilt of certain mechanical devices, which assault with intent to maim or kill, and to determine with a reasonable degree of accuracy the personal element entering into the cause of accidents.

There are a few mine operators who have not awakened to the need of accident statistics and therefore feel, when asked for certain information concerning accidents to their employes, that it is a sort of inquisition being forced upon them to disclose their private business. Far be it from this. It is for their benefit as well as for the welfare of their employes. Whatever helps human beings in the matter of health and comfort will pay good dividends to the man who provides these essentials. Sick and crippled employes in the hospital or at home are a burden to themselves and their families, the community and the State, without any benefit whatever to their employers. Even though a crippled man may be employed as a pensioner, he cannot render full service to his employer, his family nor the community.

Statistics should embody all of the information available concerning each accident if the best results toward accident prevention are to be obtained. So long as accidents occur, it is necessary for the safety engineer to keep correct and detailed records. It is not enough to know that a man fell down a shaft and was killed. Why did he fall down? Who was to blame? Was the shaft properly guarded? Could the accident have been avoided? It is the answer to these questions that should be recorded in accident statistics. The safety engineer should study intelligently every accident from all angles. If the accident was preventable, he should install a device that will prevent its occurrence again. At the close of the year, he should take an inventory of his accident records with the object of finding out what and who was to blame for each group. Having found out the principal causes, he should see that proper remedies are then applied. For example, should it be known that a certain type of machine has cut off a dozen fingers during the year, the remedy is not to supply additional fingers, but to devise a guard for the machine, or install another type for this particular work.

If human beings were perfect and it were possible to devise perfect machinery, there would be no need for accident statistics. While some one has a lapse of memory for an instant, a machine that is under human control moves three inches too far and crushes a man to death. Another man did not look where he was stepping and as a result fell down a shaft. True enough the shaft should have been guarded to prevent the thoughtless from going into it. Industries have many accidents because of mistakes; many accidents occur because of carelessness, and many because of improper mechanical devices. Mistakes are made by managers as well as by the employes, both are often careless, and both are responsible for mechanical equipment—the employer in providing it and the employe in keeping it in proper condition when installed and turned over to him to operate. The safety engineer should see that proper machinery and other appliances are installed, and he should also see that they are properly operated and cared for. The safety engineer is a "middle man" between the operator and the miner. In all industries there are a certain number of accidents that are inherent, for which it is impossible to place the blame on anyone. These equal about 50 per cent in the mining industry. The responsibility for the remainder may be placed about equally on the operator and the employe.

UNIFORM RECORDS

In order that accident records of one company or State may be comparable with those of another, they should be collected and tabulated on a uniform basis, with care taken to separate each branch of the industry from all others. The employes should be classified as underground and surface employes, with a corresponding grouping of fatal and non-fatal injuries by principal causes. Uniformity may be brought about by the standardization of State laws relating to statistics. The Bureau of Mines is doing all in its power towards this end, having had a committee draft standard

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rules and regulations as relating to metal mines. It is hoped that State legislatures will adopt as nearly as conditions will permit the rules and regulations proposed by the bureau (Bulletin 75). The safety engineers and operators can help in this.

EXACT RECORDS

Exact records of labor are necessary. These should include the number of men on the payroll; days and wages lost by reason of accidents, as well as days off duty by other causes. A classification of employes and accidents by occupation is desirable by reason of the varying occupational hazards.

The comparison of accident rates on the basis of the number of men on the payroll is not strictly correct, although it has long been used. In most cases the number of men on the payroll is considerably higher than the number actually at work, thus showing in reality a lower accident record than would otherwise appear.

Inasmuch as all industrial plants do not have the same number of working hours per day or per year, it would assist very materially in the matter of comparing accident records and rates if the safety engineers would keep records of the time actually worked by all employes. In other words, the mine that operates on the basis of 10 hours per day should have a greater accident rate than a similar one operating on an 8-hour basis, and a comparison of the two without a time adjustment is not fair to either. The company's payroll in every case, except possibly in contract labor, shows the number of hours for which wages are paid during the day, week, month, or year. Taking the number of hours as a basis upon which to calculate the accident frequency, it is an easy matter to arrive at the number of 3,000-hour or 2,000-hour workers as may be desired.

INSURANCE RATES

Lower insurance rates may be made possible by keeping correct records of labor and all accidents, and having available sufficient proof to show that the accidents at certain plants are not as high as they are at other plants of a similar nature. The absence of records has a tendency to hold the rates higher than perhaps they should be.

EDUCATION

The campaign of education for employes in the various industries has also been extended to the mining industry to the extent that many of the larger operators are making special efforts to educate their workmen in various ways. So far as accidents are concerned probably the principal thing that can be done along educational lines is to see that the employes are thoroughly instructed in the English language and as to the dangers which they encounter when they enter the mine, and to furnish them, through their superintendents and shift bosses, instructions as to how to avoid accidents and to take care of themselves. Much of this educational work may be done through safety committees, consisting in part of members from the various occupations in and about the mines, giving the miner an opportunity to make suggestions that he considers will prevent accidents in his particular working place. Many of the companies have these committees actively at work, and they are meeting with gratifying results.

In the early mining of the Lake Superior district the majority of the miners were English speaking, being largely English (Cornish) miners. Statistics show that of the English, Scotch and Irish miners in Pennsylvania coal mines, from 82 to 88 per cent had mining experience in the Old Country before entering the mines in Pennsylvania. It is believed that this figure would be representative of the English and Scotch miners in the early days in the Lake Superior district.

One of the most difficult problems with which the safety engineer has to deal at present is the employment of so many non-English speaking men from central and southern Europe, who, according to statistics for the State of Pennsylvania, have had but little mining experience before entering the mines of this country. In fact only from 3 to 20 per cent have had any mining experience. This also will hold true in the Lake district for the Slavonians, Russians, Li-

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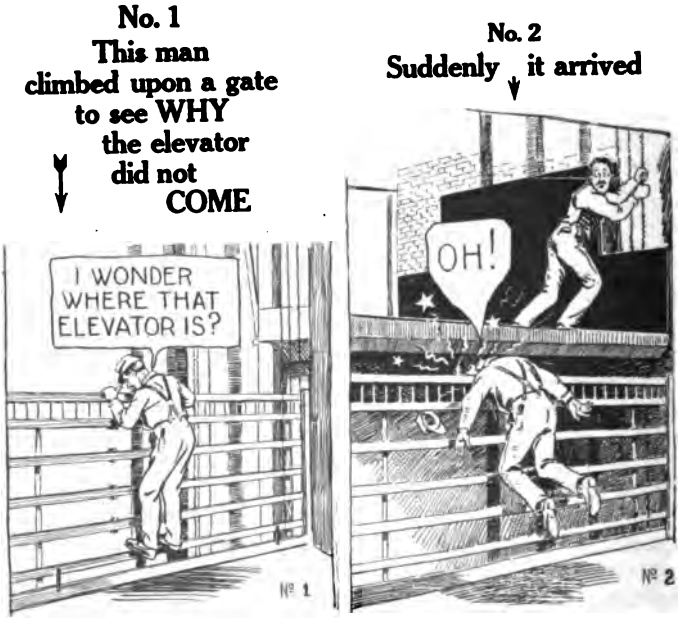
thuanians and Croatians now employed in the Minnesota and Michigan mines. Having so little experience in mining (as compared with 80 per cent in agriculture), it becomes necessary to educate these men as to the hazards of the industry and the methods that may be used and precautions taken to prevent accidents. Education in the English language will in a great measure tend to accident reduction, for the reason that the miners will then be able to understand orders that are given them and to understand the partner with whom they may be working. Until a common language is spoken, a Russian and Croatian may be working together, neither one understanding the other, and they at the same time taking orders from an English-speaking shift boss, who does not know their language. For safety there must be one language only.

The fatality rate in Pennsylvania anthracite mines among the English-speaking miners is 2.31 per 1,000 employes, as compared with 4.32 for the non-English-speaking continental European. At the Pennsylvania bituminous coal mines the rates are respectively 1.98 and 2.79, and at West Virginia bituminous coal mines the rates are respectively 4.21 and 7.48. It is not possible that herein lies one of the serious causes of accidents in the Lake district?

PUBLICITY

Another feature that will assist in accident reduction is the matter of publicity. Whenever a safety engineer finds that he has discovered some means of preventing accidents in certain branches of his work, it would be serving his fellow engineers a good turn if he would in some way let his ideas be known. Any exchange of ideas with reference to safety work among the safety engineers and operators of a district or community will result in much being acomplished toward the reduction of accidents. Spread the "Safety First" propaganda as much as possible in any manner whatever whereby an interest may be created among the employes, and in this connection make public your methods of accident prevention until there will be no need for accident statistics.

Old Game: Looking for the "Lift"


No. 1
This man climbed upon a gate to see WHY the elevator did not COME
I WONDER WHERE THAT ELEVATOR IS?
№ 1
No. 2
Suddenly it arrived
OH!
№ 2

Ford Motor Company

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Safety News and Comment

Goodyear, Not Goodrich

BY a typographical error in SAFETY ENGINEERING for August the balloon that caused the disaster in Chicago in July was said to be owned by the Goodrich Tire & Rubber Company instead of the Goodyear Tire & Rubber Company. The Goodrich company is entitled to be relieved from responsibility for that catastrophe and this correction is made for that purpose.

American Public Health

FOLLOWING is the preliminary program of the Industrial Hygiene Section of the American Public Health Association, which is to be presented at the New Orleans meeting, October 27-30. The final program will be published in the *American Journal of Public Health* appearing October 7, or may be had upon application after that date to the secretary at 169 Massachusetts avenue, Boston, Mass.:

Monday, October 27, 2 p. m.

Address of Chairman. Need and Method of Coördinating Federal, State and Local Health Agencies in Promoting Industrial Hygiene.

A Program for Organizing and Coördinating Industrial Clinics. T. Grier Miller, M. D., University of Pennsylvania, Philadelphia, Pa.

Utilizing the Out-Patient Department for Industrial Clinic Work. Wade Wright, Massachusetts General Hospital, Boston, Mass.

Utilizing Records of Plant Medical and Surgical Departments for Furthering Plant Hygiene. Bernard J. Newman.

Placement and Replacement of Employes on the Basis of Physical Examinations. Harry Mock, M. D., Chicago.

Classifying Employes and Increasing Production by Improving Their Physical Condition. Wm. J. Curry, M. D., Holyoke, Mass.

Tuesday, October 28, 9 a. m.

Fundamental Factors in Plant Hygiene. Don Lowe, M. D., Akron, Ohio.

Health Hazards of Non-Poisonous Dusts. Emery R. Hayhurst, M. D., University of Ohio, Columbus, Ohio.

Health Hazards of the Dye Industry. C. E. Ford, M. D., New York, N. Y.

Systematic and Dermatic Effects from the Use of Cutting Oils and Compounds. H. D. Pease, M. D., Lederle Laboratories, New York, N. Y.

Industrial Fatigue: Present Status of Investigations. Frederic S. Lee, M. D., New York, N. Y.

Wednesday, October 29, 9 a. m.

Special Health Hazards of Women Industrial Workers. Lillian Erskine.

The Insurance Company and Industrial Hygiene. Austin D. Reiley, New York.

The Industrial Physician and Welfare Work. W. Irving Clark, M. D., Worcester, Mass.

The Part Played by Community Insanitation in the Incidence of Industrial Diseases. Roger Perkins, Cleveland, O.

Legislative Standards in the Field of Industrial Hygiene.

Torn, Ragged Clothing

THE employes of the Crown Willamette Paper Company, West Lynn, Ore., publish a monthly paper, called *Makin' Paper,* which gives intelligent attention to the subject of safety. In a late number the men were urged not to wear loose shirt sleeves, ragged trouser legs or shirts outside of trousers while working around fast machinery:

Around the winder shaft, at 300 or 400 revolutions a minute, and still alive to tell the story and able to make paper, is truly a miracle, but none of us want to try it. However, the Champion Fiber Company of Canton, N. C., kindly furnished us pictures and particulars of an occurrence in their mill recently.

Bill reached his place of work about 7 o'clock one morning. Before changing his clothes as usual, he decided to relieve his "buddy" and change into his work clothes later. In a moment Bill's long coat caught and he went whirling around the shaft. It was a miracle he was not killed. His suit and overcoat were torn to shreds.

Does it pay, fellows, to take such chances? Does it pay to work around fast machinery with ragged, torn clothing which might also get caught on the shafts, etc.? A torn, loose shirt sleeve, tattered pants legs, or wearing a shirt outside of trousers, is a common practice

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right in our own mills. And when the safety man or foreman speaks to such a man about the dangers, the man often thinks it is his own business, and we are interfering with his personal liberties. Is it best to listen to sound common sense safety advice, or to wait and learn wisdom at the rate of 300 or 400 revolutions a minute?

Gold Watch Safety Contest

THE Inland Steel Company, Indiana Harbor, Ind., conducts each month in several of its departments a gold watch contest for safety. Cards are distributed among the men containing this announcement:

WATCH CONTEST—A 15-Jeweled Elgin Movement in 20-year gold filled case will be awarded to the ..... department provided there are no accidents causing a loss of over seven days time during the month of ....., 1919. The watch will be raffled off as soon as the month is over. Each employe has a chance to win the watch by holding the lucky number, boosting for safety and assisting to prevent accidents.

Each man in the department retains a numbered stub, on which his name is written. Safety Director J. C. Smith remarks: "At the end of the month all of the stubs are placed in a box and one drawn to determine the winner. The plan works very well, and is of value, because each man is interested and must do his part in order that the watch may be awarded to his department. From an educational point of view it is valuable, because each man is instructed how to avoid accidents. Moreover, when the watch is awarded there is an opportunity for a little safety talk to all the men when they are gathered around the place where the raffle is held."

Fire and Accident Prevention Days

OCTOBER 9, 1919, and all the week of October 9. Members of the National Fire Protection Association desiring the use of fire prevention motion picture films during the week of October 9 should at once apply to the Committee on Fire and Accident Prevention Day, W. T. Colyer, secretary, 87 Milk street, Boston. The number of films available is not large, but the committee will control the distribution of several and will arrange to have them displayed to the best advantage.

Lantern slides that illustrate in a manner at once striking and instructive the gravity of common fire hazards, or the best methods of safeguarding them, are not easy to obtain. Efforts are being made to get together a really effective set of slides for use in connection with the observance of October 9, and in the general campaign for local fire prevention meetings, which is making great headway this year. Members of the N. F. P. A. having negatives or good photographs which might be useful for this purpose are asked to communicate with the association's executive office, 87 Milk street, Boston, Mass.

Building Ordinances of Troy, N. Y.

THEY need to be modernized. The Albany *Knickerbocker-Press* gave this good advice to the neighboring municipality after a bad fire there a few weeks ago: "Troy should amend its city ordinances at once so as to prevent the further erection of buildings with shingled roofs. The recent fire in Second avenue, North Troy, in which house after house caught fire and burned, should be warning enough. Fireproof roofing costs but little more than inflammable wooden shingles, and the difference in safety is incalculable." Troy will make a good beginning toward checking the spread of fires by requiring fire-resistive roofs.

Pittsburgh Plan for Safety

THE Public Safety Committee of Allegheny County, Pa. (National Safety Council, Western Pennsylvania Division) has prepared what is called the Pittsburgh plan of public safety activities, committees and scope of work. Other cities that have a desire to handle the subject of safety in an elaborate and systematic manner may be interested in obtaining a copy of the Pittsburgh document, which they can probably obtain by addressing the Public Safety Committee of Allegheny

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County, 704 Frick Building, Pittsburgh. The Pittsburgh plan embodies an Automobile Legislation and Traffic Committee, Police Committee, Schools and Colleges Committee, Vigilance Committee, Publicity and Bulletins Committee, Statistics Committee, Speakers' Committee, Playgrounds Committee, Women's Committee, Finance Committee, Fire Prevention Committee, Safe Roads Committee, Health Committee, Boy Scouts Committee, Churches Committee, Motion Picture Committee and Law Enforcement Committee. Each committee has a long list of activities. The Pittsburgh lay-out should be studied by every other city.

Track Motor Accidents

THE track motor car which has taken the place of the old-fashioned hand car is necessary to the efficient operation of a modern railroad. C. H. Blakemore, chairman of the Safety Commission of the Norfolk & Western Railroad, remarks that, unfortunately, one of the pronounced characteristics of the track motor car is the facility with which it disables those who have much business with it:

In 1918 on the Norfolk & Western, 5 employes were killed in train collisions while 8 were killed by motor cars; also during the same year 21 employes were injured in train collisions and 71 by motor cars, viz.:

	Killed	Injured	Total
Train collisions	5	21	26
Motor car operation....	8	71	79

It is always easy to find fault, in fact it is the easiest thing we do; it is not, however, always so easy to prescribe an effective remedy; but the remedies for certain classes of motor car accidents are perfectly obvious. Many derailments have been caused by excessive speed and the injuries naturally increase in severity in proportion to the speed at which the derailment occurs.

T. H. Ince, Honorary Fire Chief

THOMAS H. INCE, famous photoplay producer, has been made an honorary fire chief of the west coast. The honor was conferred a few days ago during an assembly in Los Angeles of fire chiefs from the principal cities of the west coast. With a patriotic spirit Mr. Ince turned over to the fire chiefs all the resources of his moving picture studio at Culver City, Cal., to prepare an educational film to encourage fire prevention. This was made under the direction of Mr. Ince, with all the fire chiefs participating, and it will be shown throughout America in public schools, women's clubs, civic organizations, churches and fraternal organizations. In recognition of his patriotism and his generosity the fire chiefs unanimously elected him honorary chief and presented to him a chief's gold badge.

Holt Plant, California

THE report for 1917 of the Holt Manufacturing Company, Stockton, Cal., showed an average payroll of 2,125, and the average number of injuries per month was 284, giving a monthly accident rate of 13.4 per cent. It should be noted that this included every injury, however slight, that received attention at the hospital, including even some injuries re-

This Holt Man Practices "Safety First"

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ceived outside of working hours. The number of injuries per month serious enough to cause any lost time at all was about 20. In only 102 cases was any compensation paid under the Liability Act, amounting in all to $14,656.57. Of this amount, $10,024 was paid in 10 cases of major injuries, ranging from the loss of a finger to the loss of a leg.

The year 1918 was marked as in other plants, particularly those engaged, like the Holt factory, in war work, by high labor turnover, unintelligent labor supply, night work and rush work. Consequently, an increase in the accident rate over 1917 might have been expected. On the contrary, the monthly accident rate was reduced from 13.4 per cent to 12.4 per cent. The average number of employes in 1918 was 2,289.

While the success of the safety work is mainly due to E. W. Cummings and his associates on the Central Safety Committee, a large part of it should also be attributed to the general spirit at the plant.

"Safety First" Army

AN application to the "Safety First" Army, in use in the Willys-Morrow plant, Elmira, N. Y., is a printed card in this form:

Application to the Safety First Army—The Willys Morrow Co.,.....Division:

I hereby subscribe my name as a volunteer and promise to use all the care in my power to help the Safety Department "Go Over the Top" with a month of no accidents.

Signed ..... Dept. No. ..... Badge No.....

After signing hand card to your foreman who will mail it to the Safety Engineer.

$1,000,000 Fire Loss —And Why

RECENTLY a fire occurred in a sprinklered manufacturing plant in the Middle West that resulted in a loss of upwards of one million dollars. The Factory Insurance Association relates the facts in the case:

The plant had purchased an extra amount of raw materials, and some of this was stored in the yard close to a 6-story manufacturing building and protected from the weather by canvas tents. Nearby in an open space was an incinerator in which rubbish was burned from time to time.

A high wind was blowing on the day of the fire and sparks from the incinerator set fire to the tents and, as the factory windows were open, the flames were fanned through them and into an elevator shaft, by which latter means the fire was transmitted to several floors at once. A great number of sprinklers opened, draining the gravity tank quickly and putting the fire beyond control.

It is, of course, now apparent to all that had proper precautions been taken as to location and protection for the overflow storage and the burning of rubbish the fire would either not have occurred at all, or would have caused comparatively small damage. This is not unusual, for it is our experience that it is generally apparent after a fire that it might have been prevented had prompt action been taken in providing safeguards (frequently simple and inexpensive); and, in many cases it is also true that our inspector has noted the condition and offered suggestions covering it.

War conditions made it necessary for some concerns to utilize buildings of a temporary character for storage or other emergency use and now that the necessity for them has passed, they should be removed. Reports being received by us from our inspectors indicate that this course is being followed in a number of cases, but we want to ask, in the light of this million dollar loss that, if any frame unsprinklered buildings (no matter how small) are in use that can possibly be the means of danger to the mill buildings or storehouses, prompt arrangements be made to remove them, or to provide complete sprinkler protection at once.

Carpenter Disabled for a Year

AN employe of the Corn Products Refining Company used a ladder without safety shoes on it while changing a pulley on a motor. The ladder slipped and he fell to the floor, breaking his ankle in two places. One month after the accident he was still using crutches, and, according to the doctor, he will not be able to work again until a full year has elapsed from the date of the accident. The Accident Prevention Department of the company asks: "Who was at fault?" It answers its own question by saying that the carpenter himself, his foreman and the department foreman, who permitted him to use a ladder without shoes, were to blame. The company keeps a supply of safety shoes always on hand and has notified its foreman and others that "ladders should always be kept in a safe condition."

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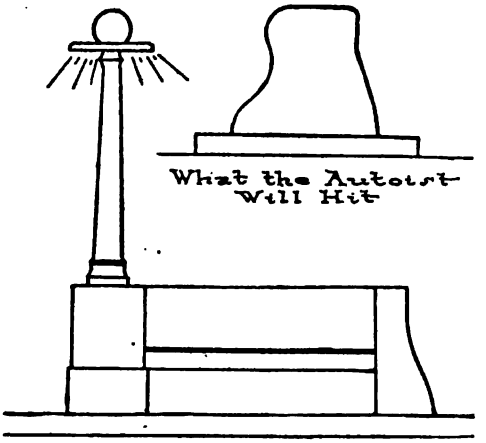
Safety Isle With a Big Bump

THE Newark (N. J.) Department of Streets plans to construct a safety isle which William A. Howell, engineer, is confident will smash any automobile that crashes into it. Because of the present construction of safety isles the lamps placed on either end of them have continually met with disaster. The city of Newark has spent thousands of dollars to replace lamps on old-type safety isles. The first safety isles in Newark were 6 inches high, built of concrete, and level throughout. During the first year several lamp-posts were snapped off by careless motorists, who ran over the ends of the isles. Later it was decided to construct the isles 12 inches instead of 6 inches in height in an effort to lessen the accidents. A new safety isle was designed which, it was thought, would solve the problem. The low hanging steps on some of the street cars, however, prevented the raising of the isle 6 inches in height and, in order to raise the ends of the isles, it was necessary to lengthen the entire safety platform and sharpen the ends in order to guard the lamp from destruction.

After this isle was finished it was found that it still did not answer the purpose. Marks of tires were left along the narrow ends, which indicated that the cars crashed in anyway, but at the same time there were no smash-ups by the general run of the motorists. When a reckless driver came along, however, he would hit the new safety isle head-on at high speed and the front wheels were forced up over the 12-inch curb and the lamppost broken.

While a great deal of damage was done to the new isle, that done to the car was in many cases sufficient to make further speeding unpleasant for the driver. In instances where this occurred the identity of the driver who met with misfortune was more quickly made known to the police who saw that reparation was made for the damaged safety isle. Of late the cases of reckless driving in Newark have become so numerous that more radical measures are to be adopted to make the isles stand motorists' jolts. The chief engineer of Newark has now directed that a bumper be placed on the end of the isle so constructed and reinforced as to be absolutely fool-proof. Instead of being 12 inches high it will be 3 feet, 9 inches high. The new bumper is designed along the same lines as the ones being used in San Francisco, of granite, and which, according to reports



Granite Bumper, Showing Seating Arrangement

from that city, has successfully solved the lamp-saving problem. The above sketches give a suggestion of the San Francisco model, which will be tried out in Newark. It carries a light at the back of the seat and affords the waiting passenger not only safety from reckless speed maniacs, but gives him a chance to sit down. The lamp designed is changed from the present model so as to include a new type of reflector which will flood the entire ends of the isles with a clear, white light. This will make it impossible for motorists who at present experience difficulty in seeing the green lights to improvise an alibi in court the next morning.

Fourth N. Y. Safety Congress

THE Fourth Safety Congress of the New York State Industrial Commission will be held in Syracuse on December 1, 2, 3 and 4, 1919.

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Step by Step One Goes Far!

Drawn by F. H. Babcock, Safety Agent, F. & L. E. R. R.

THE FOOL: "I CAN'T"
THE WISE MAN: "I'LL TRY"

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"The Man On The Job"

Prevention of Accidents by Education of Workmen, Methods of Management and Mechanical Safeguards

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 405

PERSEVERANCE. — A locomotive starting a long train of freight cars is a familiar sight to most of us, and the first thought that it suggests is the great amount of energy expended compared to the results obtained. The driving wheels, losing their grip on the rails, whirl around at a tremendous speed to the accompaniment of loud exhaust, clanking connecting rods and the creaking of wheels. This "wasted energy" continues for only a short time. The engineer sands the rails, the wheels grip and motion finally results from all this tremendous amount of energy which is being expended. If no great grades are encountered the engine has little trouble in keeping the train in motion as long as fuel is fed into its boiler.

There is a striking similarity between this and safety work. We are all creatures of habit, and habit is not unlike the inertia of the train. Once we break that habit, we will have no further difficulties.

Careful workmen are those who have given serious thought to the proper and safe way of doing their work and have therefore formed the habit of being careful at all times. There may have been temptations to take chances, but perseverance in doing the right thing soon developed the safety habit. Here is where the example of the locomotive comes in —once the habit became well started the man found it easier to keep on than to stop.

On the other hand a man who is given to taking chances and has thus far escaped injury will fail to see the logic of always playing safe, or else, perceiving the wisdom of carefulness, will find the chance-taking habit so ingrained in him that being careful at all times is next to impossible. Each time he knowingly takes a chance and escapes injury his determination to be careful will be weakened. A man who will avoid standing or passing under a crane load, and five minutes later creeps under a railway car rather than walk around, cannot be considered a careful man. It cost him little or no effort to avoid the crane load, but walking around the train might have taken five minutes. This man is not consistent, but he is typical of thousands of working men in all the representative industries of our country.

Accident prevention resolves itself into a continuous and well directed campaign to instil the safety-thinking habit into the minds of the workmen. The head of the plant must not fail to continue to give his moral and material support to the campaign. The slacking of his efforts will have its effect on his subordinates. This, in turn, will have its direct effect on the workmen, just as shutting off the steam on the locomotive will have its effect on the motion of the entire train. Steady, forward motion is overcome by friction and inertia, and the great amount of energy used in starting the train is wasted, so that the same amount must be expended again before the train recovers its lost motion.

Neither the freight train nor the safety habit is automatic or self-sustaining. A constant supply of fuel must be fed—coal in the case of the locomotive, and supervision and direction in the case of the safety work. But persistence and perseverance along these lines will gradually develop careful methods among the men and lead them to substitute these methods for the careless and chance-taking ones.

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No. 406 ALL INDUSTRIES.—SOCIABILITY AND SAFETY.—After years of quiet investigation and studious thought the writer has at last deduced that the real "Safety First" and the lasting "Safety First" principle is true sociability and the reward of merit.

If the mechanic or other man in industry were paid according to his ability or knowledge of his trade, it would be a happy consummation. This is not the case at present, due to the union system as now constituted. The only requisite now seems to be a man's union card. This fact was clearly established during the war when men who had never followed a trade simply took a position in various trades because of the money paid. Along came that angel of discord, the walking delegate, and promptly issued his manifesto that they join the union. How any sane man, who is a mechanic, who learned the trade at four or more years of menial pay, serving his master, could allow himself to be allied and classified with those who are getting money in a measure under false pretenses is more than I can understand. How can the good mechanics suffer themselves to carry this millstone about their necks? If the fellows they are carrying are worth what they get, then common sense should tell them that they are underpaid. I have often wondered why they do not insist on some method of grading men or demanding that their unions play fair in this matter. The present system seems to me an insult to their intelligence. If all trademen were graded according to their ability, I am sure one-half of the strikes and the discord could be averted, as every man would be getting his due and what it now takes to pay the real and the camouflage mechanic would be added to the real and the camouflage would be getting what he deserves. So much for merit.

If companies encouraged true sociability among their men, had functions where the men's families could meet one another, without any distinction as to nationality, for the purpose of encouraging the foreign brother to become a citizen, to make him feel and know he was the peer of any man, you would soon see that all would take a different view of life, and, instead of their listening to the subtle whisperings of the usual plant or factory Iagos, and having a secret chord of discord, their complaints would be an open book and readily adjusted.

Some under-foremen who are overzealous perhaps in their employer's interest make a huge mistake in trying to find out discordant elements by allowing certain employes to investigate and report to them. These same so-called confidence men, as a rule, generally profit by any increase caused by dissension, and if the matter were probed, it would be found that in 9 cases out of 10, they, by their inquiries, produce the incentive that creates the major portion of all strikes.

Encourage the men to awaken the talents that under present conditions lie dormant. In a word, try, by true fellowship, to make it possible to change the words of immortal Gray, "Many a flow'r is born to blush unseen and waste its sweetness on the desert air," to, "No human flower shall be born to blush unseen and waste its sweetness on the desert air."

Teach men that all are created equal, and that it is their lives and environment that sunder them. Keep our foreign brothers closely allied socially, and the effect of the commingling will inevitably eliminate any barriers which now exist. They will gladly become Americanized, and future generations will read of our present discrimination with wonder and amazement. Give the sons and daughters of the foreign-born the same social advantages that we enjoy, for how do we know but that one of these might develop into an Edison or a Marconi? Who can say which grain will grow and which will not? Cultivate all and give all a chance, make their lives fertile by companionship which begets confidence, for when this is once established all that is in mankind will show itself, and the best that is of knowledge will be ours.

❦ ❦ ❦

No. 407 ALL INDUSTRIES.—THE UPSTANDING NAIL.—Nothing is quite so mischievous as the sky-pointing, hell-headed, upstanding

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nail. No nail was ever built to stand thus; it was made to fasten together pieces of wood in a useful manner, but, by the whims of men, there are upstanding nails. Supported by a board or a block (and left there by a blockhead), the upstanding nail lifts its jagged point, and calmly awaits the unwary pedestrian, or auto tire that is apt to descend upon it.

This is how this dealer of tetanus and agony comes about: Some person—and his like is found in every trade, profession and condition of life—some person has occasion to knock apart a box, or remove a board, or otherwise divorce a nailed piece of wood from its nailee. That person being able to think only a certain distance, and content at having ripped off the board, throws it upon the ground, and the law of gravitation, plus the law of chance, causes the board to lie in such a way that at each end a row of jagged nails sticks up.

Now, this person would never think of poisoning your well, or of burning your barn, or of shooting you, but he leaves this trap in your way, and you don't notice, and you step on it!

You may get off easy. But many people do not!

There is pain, swelling, suffering, tetanus—and then the undertaker moves quietly around the parlor, and tacks up a wreath on your front door. And people say, "My! how he suffered before he died." All because some blockhead left one or more upstanding nails in your path. Maybe you are that blockhead! Well, then, somebody else is your innocent victim.

"Ain't that the truth?"

Prizes for August Articles

First Prize. No. 403. Charles J. Heil, Cudahy Packing Company, Los Angeles.

Second Prize. No. 402. G. E. Leeper, Inspector of Fire Escapes, Connecticut State Board of Education, Hartford.

Honorable Mention. No. 404. F. A. Wilkinson, Safety Engineer, American Mutual Liability Insurance Company, Boston.

Comments by Members of the Committee

Article 403 hits the heart of the safety movement in industrial plants.

In my opinion, Article 402 is, without doubt, the best article that I have read on The Man On The Job for several months. I think so much of it that I am going to have it reprinted and mailed to each safety engineer of this State.

Article 403 is sound and sensible and carries a big meaning and in my mind is the best. Article 402 is good but does not bring out enough "Safety First." Courtesy would never win with some people. As regards Article 404, it seems to me that any factory that has not got what he suggests is way behind the times.

I cast my vote for the author of Article 402. He has brought out points which are worthy of serious thought, in that "safety executives should have the asset of courtesy." This is very true, if one desires to make a success in the work. A sincere handshake and a few kind words act as a tonic.

If all persons in every walk of life practiced a little more courtesy toward one another, it would create a better feeling and understanding among mankind. Courtesy, and the ability to perform a given work, are necessary assets for progression.

Live and let live, be square to our fellow man, and the sunshine will soon make its appearance over the dark clouds—which will then have a silver lining. Cultivate the friendship of the men and success is bound to follow.

The author of Article 403 deserves credit for what he brings out, in that the foremen are the ones to be (and kept) interested in safety.

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Oil Sterilization to Reduce Infection

AT the Willys-Morrow Company's plant, Elmira, N. Y., is installed an oil sterilizing plant described by W. L. Fursman, safety engineer, as follows:

"Our cutting oil is pumped from the tank cars into the storage tanks. It is pumped through the supply lines and into the machines. From the machines it is pumped through a return line to three sediment tanks. Most of the suspended matter settles out in these tanks. A steam-driven centrifugal separator removes the finer suspended matter, and then the oil flows to the sterilizer, which is an arrangement of steam coils carrying steam pressure of 140 pounds. The oil flows slowly over these coils and is thoroughly sterilized. It then flows into the storage tanks, and the operation is repeated. I attribute the reduction of infection wholly to our perfect system. This is one of the most complete systems in the country. While this absolutely sterilizes the oil, it does not protect the doings of the careless fellow who spits in the pan of his own machine or throws into it particles of meat, etc. It was actually found that one man had taken off a bloody bandage and thrown it into his pan. This difficulty has been overcome by having men employed solely to clean the pans; and it is a big job, for in the automatic department alone there are 1,000 machines. Immediately after each machine is cleaned a solution of 1 pound of carbolic acid to 10 gallons of mineral oil is sprayed on the entire machine, and the result is shown in the reports from the First Aid."

REACHING AND INTERESTING EMPLOYES

Mr. Fursman was appointed safety engineer of the plant on November 2, 1918. He has brought the Willys-Morrow Company's plant up to such a standard of safety efficiency that during the week ended June 14 not one case of accident was reported to the Compensation Commission. That result was accomplished through a co-operation created by tactful methods and a study of human nature.

During the winter the welfare work is carried on in various ways, such as weekly dances and picture shows for the employes and their families. An exhibition is given equal to that in any motion picture house—a feature picture, a comedy for the children and an illustrated news picture of the latest current events. The pictures always end with a safety subject, to enable the safety engineer to have a heart-to-heart talk and impress the employes with the importance of their own safety. By showing this picture last the employes are more apt to carry the lesson home and receive further good advice from wife or mother.

Visitors speak of the immaculate cleanliness of the Willys-Morrow plant, for Mr. Fursman's business is "picking up." He has become so accustomed to picking up tobacco papers, waste, etc., that he has been known to pick up a piece of paper in the main street of Elmira and throw it into the gutter. These little things have been the cause of big things accomplished.

The safety director's office is in a centrally located building, termed the Safety Building, where all sorts of interesting things relating to the safety question are on exhibition, open to the men and women at all times. Mr. Fursman is present to tell them of the importance of their own safety and to help them carry out any suggestions they may make.

There is a mechanical room for the making of guards by competent machinists, and an artists' studio for the painting of signs and pictures. The safety engineer never enters the plant without having something to hand out from the safety department—suggestion cards, buttons, etc. He is now trying to get an insurance company or some other concern to send out a shop cap with "Safety First" inscribed on it. Mr. Fursman says: "If I cannot get safety into their heads I can at least put it on their heads."

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

CEMENT, TILE AND OTHER KILN INDUSTRIES

July 29, 1919. Cumberland, Md. Queen City Brick & Tile Company. Manufacturing of brick. One 1-story building destroyed. Walls, open. Floor, brick. Roof, tin. Cause, lightning. Fire started on roof. Discovered by night watchman at about 1:30 a. m. Duration, 1 hour. Stopped when roof burned off. Value of building and contents, $40,000. Property loss, not reported to SAFETY ENGINEERING.

CLEANING AND DYE WORKS

July 24, 1919. Marietta, O. Marietta Refining Company. End of State street. Dyeing. One 1- and 2-story building. Plant No. 1 destroyed. Walls, wood. Floors, wood. Roof, tin. Discovered by employe at about 7.45 a. m. Alarm, telephone. Duration, 7 hours. Stopped at main building. Private fire apparatus, hose, extinguishers. Persons in building, 50. Value of building and contents, $135,000. Property loss, $48,000.

COAL AND LUMBER YARDS

July 27, 1919. Chicago, Ill. Peoples Gas, Light & Coke Company. 1100 Kingsbury street. Coal shed. Nine 1-, 2- and 3-story buildings damaged. Walls, lath, plaster. Floors, wooden. Roofs, shingle, gravel. Cause, sparks from passing tug boat. Fire started in rubbish pile, outside. Discovered by watchman at about 7.19 a. m. Alarm, box. Duration, 4½ hours. Value of buildings and contents, $164,860. Property loss, not reported to SAFETY ENGINEERING.

COLD STORAGE AND ICE PLANTS

July 15, 1919. Denver, Col. Between West 6th and 7th avenues, Zuni and Alcott streets, adjoining the railroad tracks. One ice house, seven compartments, damaged. Walls, wood. Roof, wood. Alarm, Gamewell System. Duration, until consumed. Stopped at adjoining buildings. Firemen handicapped by lack of water. Value of building and contents, $35,000. Property loss, practically total.

CONFLAGRATIONS

July 8, 1919. Laurel, Mont. Various buildings on Main street. Grocery, general store, butcher shop, hotel, drug store, and barber shop. Six 1-story buildings, with exception of 2-story hotel. Walls, brick, 3; wood, 3. Floors, wood. Roofs, tar roofing; shingles. Cause, rubbish. Fire started in alley. Discovered at about 3.10 p. m. Alarm, telephone. Duration, several hours. Stopped at corner of block, rooming house. Firemen handicapped by gale. Value of buildings and contents, $75,000. Property loss, $38,500. Papers and records protected.

July 19, 1919. Cardiff, Ala. Various buildings northwestern part of city. Main street. Dry goods store, confectionery, pool room, cleaning and pressing shop and grocery. Thirteen buildings, all except one 1-story in height, destroyed. Walls, frame. Floors, wood. Roofs, wood. Fire started in cleaning shop. Duration, 2 to 3 hours. No fire department. Value of buildings and contents, $30,000. Property loss, $25,000.

DEPARTMENT STORES

July 13, 1919. Huntington, W. Va.

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Morrison Department Store Company. 831-833 Fourth avenue. Department store. Two 4-story buildings damaged. Walls, brick. Floors, wood. Roofs, composition. Cause, lightning. Fire started in elevator shaft. Discovered by passerby at about 6.10 a. m. Alarm, telephone. Duration, 6 hours. Stopped at adjoining building. Value of buildings and contents, $150,000. Property loss, total.

ELECTRIC LIGHT AND POWER STATIONS

July 15, 1919. Wellsburg, W. Va. Wellsburg Light & Power Plant. Corner 12th and Yankee streets. Power plant, sub-station. One 1- and 2-story building damaged. Walls, brick. Floors, concrete and wood. Roofs, slate and wood. Cause, lightning. Discovered by men at work, when lightning came in on wire at about 2 p. m. Alarm, telephone. Duration, 3 to 4 hours. Stopped when building was destroyed. Firemen handicapped by charged wires. Private fire apparatus, hand extinguishers. Means of escape, ordinary exits. Value of building and contents, $65,000. Property loss, not reported to SAFETY ENGINEERING.

FARM PROPERTY

July 28, 1919. Harrod, Ohio. Charles Johnson. Fourth street and alley. One building damaged. Walls, frame. Floors, frame. Roof, galvanized iron. Discovered by neighbors at about 12.15 a. m. Private fire apparatus, hand pump. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $1,500.

FERTILIZER AND ACID PLANTS

July 17, 1919. Grand Haven, Mich. Nicholas J. Schwartz. Along river front. Manufacturers of fertilizer, made from fish. Two 1½-story buildings damaged. Walls, wood. Floors, wood. Roofs, shingles. Fire started in fish shanty. Discovered at about 10.30 a. m. Alarm, telephone. Duration, 2 hours. Firemen handicapped by lack of hydrant, and inaccessibility of location. Value of buildings and contents, $6,000. Property loss, practically total.

July 25, 1919. Philadelphia, Pa. Harfleigh Rendering Company. Brabant and Ontario streets. Tallow rendering plant. One 2-story building damaged. Walls, brick. Floors, wood. Roof, gravel. Fire started on first floor. Discovered by watchman at about 7.48 p. m. Alarm, telegraph box. Duration, 4 hours. Confined to building of origin. No further information reported to SAFETY ENGINEERING.

GARAGES AND AUTO REPAIR SHOPS

August 3, 1919. Brooklyn, N. Y. U. S. Army Motor Transport Corps. 248 48th street. Garage. One 1-story building damaged. Walls, brick. Floor, concrete. Fire started in rear of garage. Discovered by watchman at about 9 p. m. Alarm, keyless signal box. Duration, 20 minutes. Stopped at first floor. No further information reported to SAFETY ENGINEERING.

July 5, 1919. St. Louis, Mo. Eastern Auto Garage. 618 Walton avenue. Garage. One 1-story building damaged. Walls, brick. Roof, composition. Cause, spontaneous combustion. Fire started in rear. Discovered at about 1.54 a. m. Alarm, street box. Duration, 3 hours. Confined to building of origin. Private fire apparatus, hand extinguishers. Value of building and contents, $115,000. Property loss, $46,000.

GENERAL STORES

July 12, 1919. Brownsville, Ore. Various buildings in the business district. Thirty-nine 1- and 2-story buildings destroyed. Walls, mostly wood. Floors, wood. Roofs, wood. Cause, faulty installation of boiler. Discovered by neighbors at about 1.39 a. m. Alarm, fire bell. Duration, 2½ hours. Value of buildings and contents, $58,000. Property loss, total.

GRAIN ELEVATORS

July 13, 1919. Kinsley, Iowa. Farmers' Elevator Company. First street. Grain elevator. One 40-ft. building damaged. Walls, wood. Floors, wood. Roof, wood. Cause, lightning. Discovered by neighbors at about 3.30 a. m.

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Duration, 3 days. Confined to building of origin. Value of building and contents, $20,000. Property loss, not reported to SAFETY ENGINEERING.

July 17, 1919. Los Banos, Cal. Miller & Lux. Between 5th and 6th, F and G streets, and the railroad right of way. Grain warehouse. One 1-story building damaged. Walls, wood. Floor, wood. Roof, wood. Discovered by watchman at about 8.30 p. m. Duration, building, 2 hours; grain, 3 days. Value of building and contents, $125,000. Property loss, $50,000.

July 19, 1919. New Sharon, Iowa. H. B. McVeigh. Grain elevator. One 85-ft. building damaged. Walls, wood, metal covered. Floors, wood. Roof, asbestos. Fire started in basement. Discovered at about 9 a. m. Alarm, telephone. Duration, 2 days. Value of building and contents, $35,000. Property loss, $15,000.

HOSPITALS AND SANITARIUMS

July 19, 1919. Muskogee, Okla. Warmack Maternity Hospital. One 3-story building damaged. Walls, brick. Floors, wood. Roof, shingle. Cause, electric iron. Fire started in private laundry in basement. Discovered by matron at about 10.55 p. m. Alarm, telephone. Duration, 2 hours. Fire was outside city and water limits. Value of building and contents, $63,000. Property loss, total.

HOTELS AND LODGING HOUSES

May 25, 1919. Cambridge, Mass. Riverbank Court. Charles River road. Apartment hotel. One 6-story building damaged. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, unknown. Discovered by neighbor when flames were seen at about 2.28 a. m. Alarm, box. Duration, 6 hours. Stopped in building of origin. Private fire apparatus, hand extinguishers. Persons in building, 200. Means of escape, fire escapes. Value of building and contents, $421,000. Property loss, $20,000.

MANUFACTORIES, MISCELLANEOUS

July 14, 1919. St. Louis, Mo. Wood & Down Box Manufacturing Company. Mullanphy and 13th streets. Dealers and second-hand boxes. One 2-story building damaged. Walls, corrugated iron. Floors, wood. Roof, gravel. Cause, spontaneous combustion. Discovered by employe at about 3.08 p. m. Alarm, street box. Duration, 15 hours. Confined to building of origin. Private fire apparatus, none. Persons in building, 5. Value of building and contents, $40,000. Property loss, $12,000.

July 26, 1919. Adams, Mass. Berkshire Cotton Manufacturing Company. Mill No. 3. Depot and Hoosac streets. Manufacturing of cotton cloth. One 5-story building damaged. Walls, brick. Floors, plank. Roof, gravel. Cause, short circuit in old type rosette. Fire started in basement. Discovered by engineer at about 3.05 p. m. Duration, 30 minutes. Firemen handicapped by dense smoke. Private fire apparatus, 4 lines from pump. Means of escape, ordinary exits. Value of building and contents, $2,500,000. Property loss, $15,000.

July 23, 1919. Lincoln, Ill. Lincoln Horse Collar Factory. South Kickapoo street. One 3-story building destroyed. Walls, brick. Floors, wood. Roof, pitch and gravel. Cause, spontaneous combustion. Fire started on 2d floor. Discovered by watchman at about 3.20 a. m. Alarm, telephone. Duration, 20 hours. Stopped when building was consumed. One person in building. Value of building and contents, $325,000. Property loss, total.

July 31, 1919. Newark, N. J. Maas & Waldstein Company. 437 Riverside avenue. Manufacturers of chemicals. Three buildings damaged, two 1-story and one 2-story. Walls, brick. Floors, cement. Roofs, slag. Cause, friction in machinery. Fire started in lacquer machine. Discovered by employe at about 12 noon. Alarm, telephone. Duration, 10 hours. Stopped at second unit of 10 brick parapetted units. Fire was retarded by parapetted walls. Private fire apparatus, hose, chemicals. One person in building. Means of escape, adequate. Value of buildings and contents, $300,000. Property loss, $100,000.

August 1, 1919. Detroit, Mich. Wads-

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worth Manufacturing Company. Northwest corner of Jefferson and Connors Creek. Manufacturers of automobile bodies. Eight buildings, from 1- to 6-stories, damaged. Walls, brick. Floors, mill. Roofs, flat, tar and gravel. Cause, sparks from incinerator. Fire started in yard just behind main building. Discovered by police at about 6.50 p. m. Alarm, street box. Duration, 26½ hours. Private fire apparatus, sprinklers, 5,000 gallon tank. Watchman in building. Means of escape, adequate. No further information reported to SAFETY ENGINEERING.

MERCANTILES, MISCELLANEOUS

July 17, 1919. Augusta, Ga. Wright Drug Company. 912 Broad street. Drugstore, ice cream. One 1-story building damaged. Walls, brick. Floor, wood. Roof, tin. Discovered by fireman, off duty, at about 2:30 a. m. Alarm, Gamewell System. Duration, 1½ hours. Stopped on same premises. Firemen handicapped by smoke and fumes. Private fire apparatus, none. Means of escape, ordinary exits. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $12,500. Valuable records and papers found intact in safe.

July 18, 1919. Paducah, Ky. McKinney-Guedry Wholesale Grocery. Southeast corner of Second and Washington streets. One 2-story building damaged. Walls, brick. Floors, wood and concrete. Roof, composition gravel. Fire started on 2d story. Discovered by passersby at about 12.20 a. m. Duration, 6 hours. Stopped in building of origin. Firemen handicapped by barred windows and doors. Private fire apparatus, none. Injured, 2 firemen, by falling walls. Value of building and contents, $75,000. Property loss, not reported to SAFETY ENGINEERING.

July 23, 1919. Akron, Ohio. Dodge Furniture Company. 24-26 South Howard street. Furniture store. One 4-story building damaged. Walls, brick. Floors, wood. Roof, wood. Cause, unknown. Fire started in cellar. Discovered by patrolman at about 12.45 a. m. Alarm, telephone. Duration, 1 hour. Stopped at top of elevator shaft. Private fire apparatus, 3-gallon extinguishers. No further information reported to SAFETY ENGINEERING.

July 30, 1919. Belleville, Kan. Eagle Grocery Company and other buildings. Main street. Four destroyed; one damaged; all 2 stories. Walls, stone and brick, frame partitions. Floors, wood. Roofs, tin. Fire started in grocery store. Discovered at about 9.30 p. m. Alarm, telephone and bell. Duration, under control in 3 hours. Stopped at wall of fifth building. Firemen handicapped by poor pressure. Private fire apparatus, none. Value of buildings and contents, $53,700. Property loss, $27,000.

MISCELLANEOUS

July 27, 1919. Philadelphia, Pa. Murdock & Company. 3447-3455 Collins street. Dealers in wool and cotton waste. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Fire started on 2d floor. Discovered by watchman at about 2.42 a. m. Alarm, telegraph. Duration, 5 hours. Stopped at roof. Means of escape, fire escapes. No further information reported to SAFETY ENGINEERING.

July 30, 1919. Hightstown, N. J. Schanck, Hutchinson & Field. Williams street. Hay press. One 1-story building damaged. Walls, concrete piers. Floor, wood. Roof, corrugated iron. Cause, unknown. Fire started in north corner. Discovered at about 3.20 a. m. Alarm, siren. Duration, 36 hours. Value of building and contents, $15,000. Property loss, $6,000.

July 31, 1919. Philadelphia, Pa. Home Preserving & Pickling Company. 707-709 Tasker street. One 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, unknown. Fire started on 1st floor. Discovered at about 1.48 a. m. Alarm, telegraph box. Duration, 6 hours. Means of escape, outside fire escape. No further information reported to SAFETY ENGINEERING.

OIL WORKS AND TANKS

July 18, 1919. Grand Rapids, Mich.

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Standard Oil Company. 1260 Butterworth avenue. Warehouse. One 1-story, basement building damaged. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, collision between freight and oil trains. Fire started at 8.15 a. m. Alarm, street box. Duration, under control in 10 hours, extinguished in 21 hours. Confined to same premises. Fire was retarded by wireglass and metal frames, also by fire walls. Value of building and contents, $300,000. Property loss, $250,000. Records and valuable papers protected.

July 31, 1919. Charleston, West Virginia. Ohio Cities' Gas Company. Dawes, on Cabin Creek, 20 miles away from Charleston, in mountains. Oil in steel tanks communicated to smaller one of other operators. The creek was dammed to retain the burning oil. Cause, lightning. Private fire apparatus, steam lines. Value of buildings and contents, $250,000. Property loss, not reported to SAFETY ENGINEERING.

PAPER AND PULP MILLS

August 9, 1919. Rumford, Me. Oxford Paper Company. 8,000 cords poplar in big pile. Cause, sparks from engine. Discovered by mill watchman. Alarm, telephone. Duration, 3 days. Value of lumber, $150,000. Property loss, not reported to SAFETY ENGINEERING.

SLAUGHTER AND PACKING HOUSES

July 27, 1919. Syracuse, N. Y. Swift & Company. 235-241 Walton street. Packing house. One 2- and 3-story building damaged. Walls, brick. Floors, wood and cement. Roofs, tin. Cause, unknown. Fire started on 1st floor. Discovered by outsider at about 5.13 a. m. Alarm, street box. Duration, 6 hours. Stopped at center of building. Firemen handicapped by ammonia fumes. Value of building and contents, $800,000. Property loss, $72,500.

THEATERS AND AMUSEMENT PLACES

July 13, 1919. Lehigh, Mont. Liberty Theater. Main street. Theater, pool hall. Two 1- and 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Cause, cigarette. Fire started under stage. Discovered by workmen at about 3.30 p. m. Alarm, whistle. Duration, 3 hours. Stopped when buildings were consumed. Firemen handicapped by lack of water. Value of buildings and contents, $45,000 Property loss, total.

WAREHOUSES, PUBLIC STORES

June 27, 1919. New Orleans, La Mente & Co. South Peter, corner of Robin street. Warehouse of bag factory. One section of 1-story building damaged. Walls, 1½ brick, fire walls every 100 feet, 3 feet over roof. Floor, cement. Roof, slate. Fire started in section of building stored with bales of sacks to roof. Discovered by workman at about 10 a. m. Alarm, messenger. Duration, 12 hours. Stopped in section where it originated. Fire was retarded by fire walls. Firemen handicapped by bags piled in yard, and by bales packed to roof in solid mass, blocking all doors. Private fire apparatus, extinguishers, hose. Persons in building, 300 men and women. Value of building and contents, $1,731,000. Property loss, $37,000. Valuable papers and correspondence protected in safes.

July 1, 1919. Indianapolis, Ind. Indianapolis Cordage Company. South Meridian street and Belt Railroad. Warehouse, filled with sisal. One 2-story building damaged. Walls, wood,-corrugated iron. Floors, cement. Roof, tar paper. Cause, electric spark. Fire started in west end of building. Discovered by workman at about 10:57 a. m. Alarm, telephone and signal box. Under control in 2 hours, burned for 3 weeks. Private fire apparatus, small extinguishers. Sprinkler system being installed. Persons in building, 15. Value of building and contents, $200,000. Property loss, $150,000.

July 12, 1919. Philadelphia, Pa. Jacob Potash & Bros. 609-613 North American street. Dealers in burlap and cement bags. One 5-story warehouse building damaged. Walls, brick. Floors, wood. Roof, wood, tin, gravel. Fire started on third floor. Discovered by

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citizen at about 12:19 p. m. Alarm, box. Building collapsed in half hour, smouldered for days. Firemen handicapped by windows blocked with contents. Private fire apparatus, water buckets. Killed, 6. Injured, 32, when building fell in. Means of escape, fire escapes. No further information reported to SAFETY ENGINEERING.

WOODWORKERS

July 22, 1919. Marinette, Wis. Miller Sash & Door Company. Main street, between 4th and 5th streets. Planing mill, sash and door factory. Five 2- and 1-story buildings destroyed. Walls, frame, except brick fire room. Floors, plank. Roofs, shingles; roofing. Cause, sparks from fire room. Fire started in room over fire room. Discovered at about 3.20 p. m. Alarm, fire box. Duration, 3 hours. Stopped at adjacent buildings. Fire was spread by dust and shavings. Private fire apparatus, none. Persons in buildings, 15 or 20. Means of escape, ordinary exits. Value of buildings and contents, $20,000, estimated. Property loss, $15,000, estimated. Papers and correspondence carried to place of safety.

KILLED AND INJURED IN FIRES

June 15, 1919. Placerville, Colo. Various buildings on Main street, consisting of hotel, garage, livery barn, pool halls, general store and dwellings. One person injured.

June 18, 1919. Delaware, Ohio. Neville Brothers and others. One person injured.

June 26, 1919. Groveland, Cal. Cazzaetto Store and others. One person injured.

June 27, 1919. St. Paul, Minn. St. Paul Gas Light Company, office building. Two firemen injured.

July 1, 1919. Danbury, Conn. Siefert & Goos. Two firemen injured. Eight horses burned.

July 2, 1919. Stroudsburg, Pa. International Boiler Works, at East Stroudsburg. One person injured.

July 12, 1919. Philadelphia, Pa. Jacob Potash & Bros. Six persons killed, 32 injured, in collapse of building.

July 18, 1919. Paducah, Ky. McKinney-Guedry Wholesale Grocery. Two firemen injured by falling walls.

Value of Industrial Training

COLONEL WOODS, assistant to the Secretary of War, is urging 20,000 factory owners and industrial corporations to undertake industrial training for their workers. That greater production means lower prices is axiomatic. That this result can be accomplished with those very men who are at present classed as unskilled laborers is abundantly proved by the experience of a number of factory owners. The superintendent of one of the biggest metal working establishments in the country states that mechanics who have been with them for two years were given one week of training, as a result of which they doubled their individual production. In another plant a worker returning from the training department by 11 o'clock did what has been estimated formerly to be a day's work. In a shoe factory in Brooklyn, 60 soldiers were recently employed who had had no previous training in shoe production, and who were taken on with the avowed intention of being put through the training course in order to be taught their trade. The men started at $15 per week, and after a training varying from three to six weeks some of these men are earning as high as $70 a week.

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Literature of Safety

Accident Prevention, Fire Prevention, Hygiene, Sanitation, Miscellaneous

SAFETY REGULATIONS OF THE GENERAL ELECTRIC COMPANY. July, 1919. 74 pages.

This is the most recent manual for the use of employes and one of the few for the electrical industry. It can hardly be called a manual for electrical workers or electricians, as it covers all departments of production. In the foreword, the secretary of the general committee on safety and sanitation of the General Electric Company, Magnus W. Alexander, makes the following statement: "Through the clearing house of the general committee, every safety idea found in practical use in any of the company's plants or elsewhere is carefully analyzed and tested and, when need be, improved upon before it is adopted for general use. . . . Thus the general safety committee has standardized safety policies, specific safety appliances and protective devices."

The manual is distinctly an operating guide rather than a construction guide. It differs vastly from such manuals as those of the Illinois Steel Company *Construction Guide*. It leaves such matters to the technical expert and engineer. The language, type and size of the book are adapted to the use of the operative, it being designed to be carried in his pocket and read without the use of eyeglasses.

We call especial attention to the instructions for the safe operation of oil and gas furnaces (p. 14-16.) A number of pages are devoted to ladders, in this instance construction data being included, and a table for dimensions of single wood ladders and for wooden extension ladders. We read the following: "Portable wood ladders, used where stairways or fixed ladders are impractical, must be made of first class material. Before being placed in service, they should be oiled with raw oil, painted and fitted with non-slip shoes." The kinds of wood to be used, their strength and durability are also given. The rules for cranes are based upon standard practices, but are clearly and simply worded. The book also includes rules for electrical apparatus, general machinery, fire protection equipment, elevators, foundries, welding, etc. A chapter describes the prone method for resuscitation.

Altogether this is a useful manual, popular in style, easily read, and contains a number of practices and rules not easily found elsewhere.

HOURS OF WORK AS RELATED TO OUTPUT AND HEALTH OF WORKERS; METAL MANUFACTURING INDUSTRIES. National Industrial Conference Board. Research Report No. 18, July, 1919.

This is the fifth report on Hours of Work, previous ones on cotton manufacturing, boot and shoe industry, wool manufacturing and silk manufacturing having been published some time ago.

Like its predecessors, it is based upon first hand information from data secured from two questionnaires, one sent out in 1917 and the second in 1919. The conclusions as to output are as follows:

1. A 50-hour week has proved efficient and practicable in a large number of metal manufacturing establishments.
2. A 48-hour week has proved practicable in a considerable number of establishments.
3. The piece-rate system is more conducive to current efficiency of production than is the day-rate system.
4. There is no clear-cut line below which a reduction in hours brings a practically uniform change in efficiency of production in different establishments.

The data on health conditions are too insufficient to be reliable.

INSPECTION OF FACTORIES AND PUBLIC BUILDINGS. Labor Laws of the Province of Quebec.

It is not very often that we come across an industrial code that words its rules in such brief, pointed and unmis-

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takable terms. Perhaps the reason is that the original laws are in the French language and the English is a translation from it. No one can misunderstand the rule: "Handling Belts—The inspector may order that belt-shifters, belt-mounters and other apparatus be put up for handling belts on shafts, and the foreman must explain the working of these to the workman charged with handling the belts. It is strictly forbidden to connect by hand a belt more than 3 inches wide unless the power has been slowed"; or this: "Workmen shall not undertake to oil, inspect, clean or repair machines in motion or moving parts of machinery unless previously authorized to do so by the foreman or overseer."

There is a list of establishments classified as "dangerous, unhealthy or incommodious," such as "abattoirs—danger of accidents: arsenic (white)—dangerous dusts," etc.

Other regulations deal with foundries, steam boilers, and apparatus, a sanitary code, the usual building laws, the workmen's compensation law, rules for stationary engineers and the industrial arbitration law. There are also a few good articles on various phases of industrial accidents and disease, reprinted from the French and English. The pages contain parallel columns in French and English.

TRAINING COURSES IN SAFETY AND HYGIENE IN THE BUILDING TRADES. Federal Board for Vocational Education, Washington. Bulletin No. 31. Trade and Industrial Series No. 6. May, 1919.

This is the first safety instruction book issued by the Research Division of the Federal Board, others being in preparation. While primarily a text book for students in vocational evening and part-time classes, it ought also to be of value to the engineer, the contractor, the workman and, to a certain extent, the general public. The material has been gathered from many sources—standard practices, safety regulations, magazine articles and books—to all of which due credit is given. The chapter headings are: Demolition, Excavations, Blasting, Hoisting, Storing Materials, Scaffolding, Accidents in Allied Trades, Miscellaneous Hazards, Emergency Provisions and Suggestions to the Teacher. We wish that the last-named chapter could have been made fuller and hope that the board will issue more instructions to the teacher in the next volume. Our teachers need almost more instruction in these lines than their pupils. The chapter on Scaffolding is especially good.

While no subject is dealt with at any great length, the references to further study and the syllabus, as outlined for teachers on pages 117-122, enlarge the scope. We are also pleased to notice that the bibliography refers to material easily available. Safety engineers will find a good many helpful suggestions in this book, especially in teaching their men safe practices. As a manual for vocational schools it serves a distinct need, and we hope that it will be generously distributed.

MORTALITY IN THE CITY OF NEW YORK FROM ACCIDENTS AND NEGLIGENCE DURING 1918. W. H. Guilfoy, Registrar of Record. In the *Monthly Bulletin* of the Department of Health, City of New York. June, 1919.

We are still living in the dark ages of carelessness. Nothing so pointed has recently been brought to our attention as this report of Dr. Guilfoy. Four thousand deaths occur every year in the city of New York as a result of accidents, many of them avoidable and preventable. In 1918, 818 persons were killed by being run over by automobiles, wagons and other vehicles, of which 296 were children under 10 years of age. In 1917, the total deaths from the same cause were 530, so that 1918 showed an increase of 147, or nearly 28 per cent. The mortality from falls of all descriptions is found to be 18 per 100,000 of the population in the Borough of Manhattan, 15 per 100,000 in Brooklyn, 14 in Richmond, and 12 in both Bronx and Queens. The total number of deaths from falls was 922. A table shows the deaths for 1918 in comparison to the average for 1913-17. The greatest increase was in the number of vehicle accidents, while falls showed a decided decrease.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

THE BENEFITS OF MODERN SANITATION

Most everybody knows that his health is improved by sleeping with the windows open and by exercising in fresh air, but a good many people overlook the fact that with a little care, and sometimes at no additional cost, inside conditions can be made almost as health-giving as the open air.

There are danger spots in all buildings where large numbers of human beings are gathered, whether these buildings be devoted to manufacturing commerce or education.

The chief danger spot is naturally the toilet and wash rooms, and particular care should be given to the sanitation of such rooms.

It is a good basic principle in engineering to make nature work when possible; and in the Washington School at Rutherford, N. J., there is an interesting installation of Ebco ventilated plumbing fixtures in which there is an appreciably active circulation of air induced naturally and without the assistance of blower or suction fan, excepting under unfavorable atmospheric conditions.

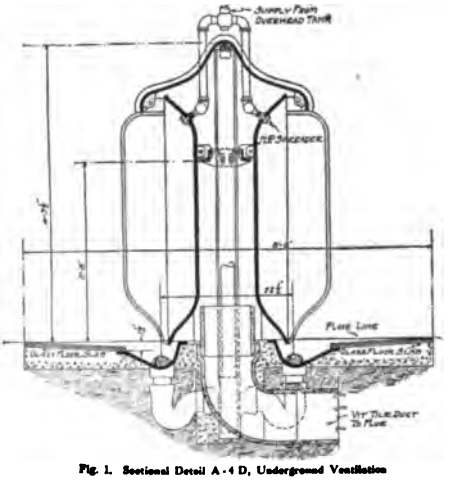

Fig. 1. Sectional Detail A-4 D, Underground Ventilation

Installation "Ebco" ventilated toilet fixtures at the Washington School, Rutherford, N. J.

The arrangement of the twelve urinal units is shown in the accompanying illustration and the action of the air is clearly indicated in the sectional drawing herewith.

The D. A. Ebinger Sanitary Manufacturing Company, who designed and manufactured these fixtures, claim that the proper place to draw off impure air is at the floor line, as the foul air is heavier than the pure air and seeks a downward outlet.

The factory plumbing codes differ materially in several states, but they all tend to the same results.

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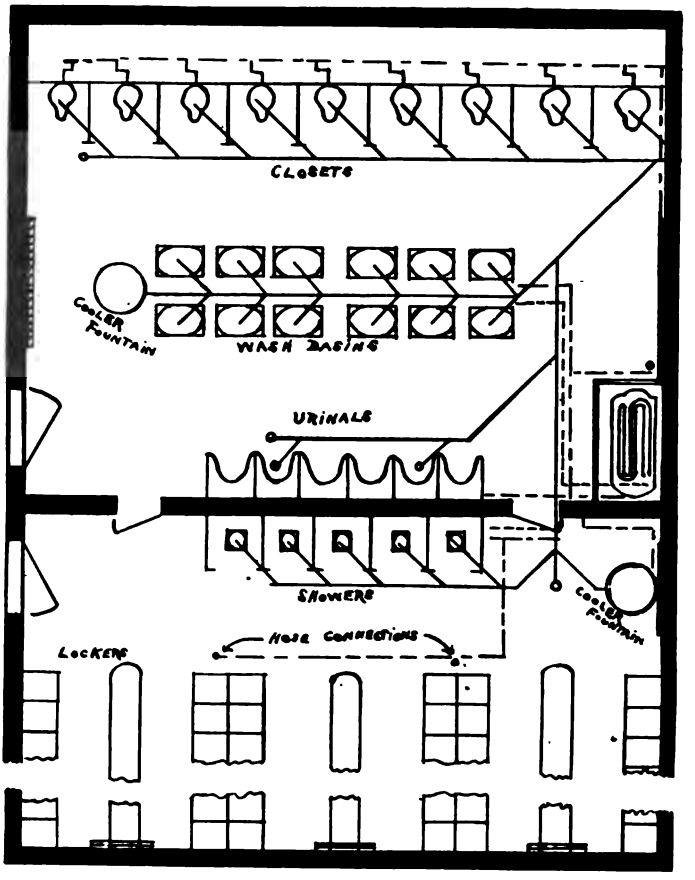
A toilet room is planned with a certain number of cubic feet for every operator. It is customary also to provide a certain number of units in plumbing fixtures for a given number of men. The manufacturer has combined these two ideas and provides ample vent area to thoroughly ventilate. The company contends that under conditions that ought to and do prevail in modern factories, it can eliminate the old disease breeding and foul smelling room.

Even the water closets are made to assist in this work, and the effects in a women's toilet is very perceptible. A student of sanitation and hygiene will advocate the use of automatic water closets, but he will appreciate the opportunity to equip his building with a toilet which not only is automatic but contributes in providing fresh air at all times.

Another point which the manufacturer presents is the advantage of having sanitary installations considered as a whole, so that the several classes of fixtures may operate in harmony and not draw water and air from each other. The plan shown here is a memorandum sketch submitted recently to a prominent manufacturer at his request, for the remodeling of his toilet room.



Plan of wash room, showing Ebinger fixtures, lockers, waste lines and supplies for hot and cold water

The arrangement has elicited favorable comment from authorities, and this sort of layout is gladly made to assist safety engineers and welfare directors in their deliberations on this important subject of sanitation through ventilation.

THE SANITARY SAND BLAST HELMET

In many manufacturing processes the sand blast has proven economical and efficient but it entails a very grave danger to the worker who handles it unless he is properly protected.

The Sanitary Sand Blast Helmet as manufactured by J. A. Spangler of Benton Harbor, Mich., possesses many features which command careful consideration by safety engineers.

It is made of aluminum and weighs complete but 22 ozs.

It is very durable, strictly sanitary and constructed throughout of non-rusting material which permits it to be scalded with hot water or steam after the day's work is finished and which makes it clean and pure for the next day's work.

It is comfortable to wear, allows an unobstructed view of the work, will last from four to six times as long as some other types, and when used in connection with compresssed air absolute protection against dust, smoke, and gases is claimed.

Four years of actual service have demonstrated its utility. A recent improvement has been to place the air connection directly on top of the helmet. The adoption of aluminum as the material for this helmet gives a resistance practically equal to steel and yet of most comfortable lightness.

MAX JACABSON

In addition to the Lungmotor, Max Jacabson, of 25 West 42nd street, New York City, is handling a line of safety appliances, including first aid kits, protective clothing, goggles, etc. He is prepared to fill orders for all kinds of accident preventive products.

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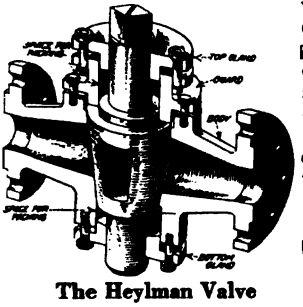
DESCRIPTION OF A NEW DESIGN BLOW-OFF VALVE

As a blow-off valve is distinctly a "safety" appliance, the construction of the Heylman valve as manufactured by the M. H. Treadwell Co., Inc., is interesting, and in studying the design the reader must bear in mind that its "safety" depends upon the degree of certainty in its operation.

In the first place, it is necessary for every stop-cock to be tight and to be quite free from pitting or grooving, in order to prevent losses through leakage. To keep the stock-cock in this condition it is advisable to move the plug around two or three times, instead of the customary half or quarter turn. This prevents the excessive wearing of one side, as is the case with most stop-cocks, and will greatly reduce the cost of repairs, such as grinding, etc.



The Heylman Valve

Only in case of emergency, which will be very seldom in this type of stop-cock, the plug may be lifted if too tight, but the chances of getting dirt, sand or scale between the two surfaces, viz., of plug and body, are very great and may result in the cutting of the surfaces, followed by the customary leakage.

The stop-cock should first be very carefully packed on top, both ends of the packing rings fitting close together. A medium soft asbestos packing, sprinkled with dry graphite, will usually give the best results, with no fear of getting too hard.

It is advisable to tighten the top gland to such an extent that the plug is hard to turn, after which the bottom end should be packed in the same manner as the top, the packing being drawn tight enough to release part of the pressure on the plug, after which the stop-cock will be ready for use and will turn evenly and smoothly.

The possibilities of this stop-cock sticking are very slight, but should it turn rather hard, loosening the top gland and tightening the bottom, will at once eliminate the difficulty.

The construction is very simple, and both ends being packed and lubricated with the plug in equilibrium, it will move under the same conditions as a shaft in a lubricated bearing.

The directions for operating the Double-Packed Blow-off Valves are as follows and are the results of trials made with valve in a high pressure steam power plant.

When installing the blow-off valve, be sure that the plug is held firmly in the housing with the top gland.

If the valve sticks when it is not in operation, screw up on the bottom gland until the valve operates without using much strength.

When using two blow-off valves in tandem, first open the valve nearest the boiler very slowly. This valve will always operate easily. Then open the outside valve very slowly until it sticks. Then wait a few minutes until the body of the valve is warm and then throw the valve wide open. The valve will operate very easily as soon as it gets warm, so be sure and have the pressure of the packing upon the plug equalized.

With reference to the operation of blow-off valves in general, read paragraph No. 11 on "Boiler Room Orders," published by the Hartford Steam Boiler Inspection and Insurance Company under "Routine Use of the Blow-off."

"To remove sediment from the bottom of the boiler, open the blow-off valve in the morning or before the circulation has started up. The valve should be opened up wide for a few moments, but it should be opened and closed slowly so as to avoid shocks from water hammer action."

OIL OF SALT

Oil of Salt is a non-irritating first aid antiseptic for cases of burns, open wounds, bruises, etc. When applied to the injury it quickly relieves pain, destroys and prevents infection and poison and heals rapidly. In cases of minor injuries Oil of Salt will stop the flow of blood when it is applied.

Oil of Salt is unlike other antiseptics in that its application is non-irritating, but immediately soothing. Most antiseptics are irritating upon their first application and sometimes are very painful. This is especially true with iodine and carbolic acid. Iodine when too freely used is likely to cause iodine poisoning and carbolic acid when too strong causes the flesh to burn and wither, leaving an ugly scar.

The C. C. Mosso Laboratories, 2253 Warren Avenue, Chicago, has prepared a leaflet on Oil of Salt, giving many testimonials and a large list of prominent firms who are using it. Copies may be had for the asking.

THE SURTY GUARD COMPANY

It is gratifying to many safety engineers who are planning to make all of their dangerous machinery safe, to know that they can get practically every requirement needed from one company, and not have to send out orders to a half a dozen companies. The Surty Guard Company, Chicago, Illinois, make safety devices for every type of circular saws, band saws, punch presses, jointers, emery wheels, shapers, gears, belts and other kinds of dangerous machinery. They also manufacture belt handlers, cone belt shifters, exhaust booths and systems for removing dust, odors, fumes, etc. They will gladly send their literature on any of these products to those interested.

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KEPPLER GLASS CONSTRUCTIONS

The requirements for roofing train sheds, warehouses, and large industrial buildings are for maximum light, great strength, and a degree of fire resistance.

A very interesting solution of this problem may be found in Keppler Glass Constructions which by an ingenious design provide an all glass under surface with reinforced concrete retaining surface on the exposed side.

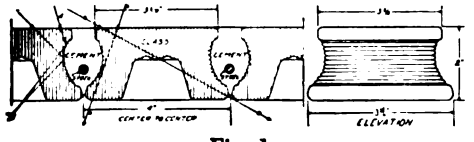

Fig. 1

The accompanying drawing shows an individual moulded glass unit and the manner in which, when in place, unobstructed light is obtained by refraction in spite of the outer reinforced concrete binding.

Fig. 2. Interior U. S. Army Base

Illustrations are also shown of the interior and exterior of the U. S. Army Base at Brooklyn, N. Y. Looking up from the floor of this building the small moulded units do not show and the impression given is of plates rather than blocks of glass.

The safety feature is most conspicuous in the positive protection against falling glass in case of destructive accident, and only the complete wrecking of a section of the roof such as might result from a violent explosion could possibly loosen any of the material.

This form of glass is also used in wall construction as shown above the rolling shutters in figure 4.

Fig. 3. Exterior U. S. Army Base

The construction permits of flat roofs, roofs at any angle of pitch, or vertical walls.

The greatly increased light area is a matter of importance to safety engineers and the practically homogeneous surface gives added durability and resistance. The manufacturers, Keppler Glass Constructions Inc. of New York, claim an extraordinary low cost of maintenance.

Fig. 4

NEW ENGINE INSURANCE

A new line of insurance is announced by the Travelers Indemnity Company. It is intended to cover engine breakage, and will be known as engine insurance.

This line of insurance should prove popular. There has been much demand for it for years, although no company has written it in this country until now. Secretary James H. Coburn, of the Travelers Indemnity Company, in his announcement, which is over President Butler's signature, says:

"The policy will cover the sudden, substantial and accidental breaking of the engine or any of its part while it is running which immediately prevents its continued operation

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and which necessitates repair or replacement before its operation can be resumed. The coverage is confined to the engine proper, including the main crank shaft together with the wheels mounted thereon, except rotary fields, armatures and other electrical apparatus. It does not include the supply pipe or the exhaust pipe of the engine nor any mechanism or appliance driven by or connected to the engine. The policy will not cover damage to bearings due to overheating, nor parts which have broken or failed because of wear or tear."

The company will furnish an inspection service calculated to prevent breakdown, although unforeseen accidents in so highly complicated a mechanism as a modern engine cannot by any means be entirely eliminated.

Inspection and accident-prevention will be a part of this line—indeed a very important part, just as they are in steam boiler insurance. Like Chinese physicians, who are said to receive retainers for keeping their patients from falling ill, the engineers of The Travelers aim to bring it about that there shall be no accidents or engine breaks to pay damages on.

DALZELL BROTHERS COMPANY GET BIG MACHINE GUARD CONTRACT

The accompanying picture shows part of a large number of machine guards recently completed by the Dalzell Brothers Company. These guards are part of a three thousand dollar contract for furnishing and placing guards on more than fifty machines at the Standard Car Constructions Company's plant, Sharon, Pa.

Machine Guards built by Dalzell Brothers Company for the Sharon Car Construction Company.

The Dalzell Brothers Company is located in Youngstown, Ohio. Their location and modern facilities for machine guard building are very attractive to safety engineers in western Ohio and eastern Pennsylvania. This company also manufactures fire doors and ventilators.

ACME PORTABLE MOTION PICTURE PROJECTOR

To make a success of a safety campaign there is no better means than the motion picture projector. A good safety film will do more to attain the desired results than a dozen safety talks will do. You can show every detail of bad and good practices and their effect and at the same time hold the complete attention of the audience. It is very often better to take the picture to the men than to have the men come to see it. "Safety First" is one thing that has to be put right in the hand of the average workman because he will never go after it himself.

Interior of the Acme Portable Motion Picture Projector.

The Acme Portable Motion Picture Projector is a compact machine of the suitcase type, 17 inches long, 18 inches high, 7¾ inches wide and weighs but 24 pounds.

The building of a portable projector such as the Acme is a problem in mechanics as much as the making of a high grade watch, or an aeroplane or the finest motor car. Every single part of the Acme Portable Projector has had the attention of an expert, first as a unit, and second, in its relation to all other parts.

This projector takes the standard 1,000 ft. reels. It is motor driven, can be used on alternating or direct current without any changes whatever, the motor being universal. The lamp is of the nitrogen filled, concentrated filament stereopticon type, and may be used on either of the above currents. This machine is equipped with suitable connections so that it can be operated from an ordinary lamp socket by anybody.

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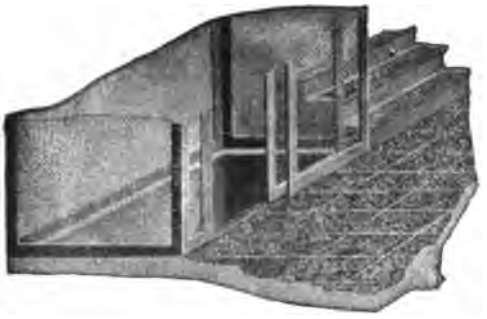
VULCALUN

A New Anti-Slip Walkway or Tread Surface

The realization of the need for greater safety in walkway surfaces is spreading rapidly. Never before have the demands for friction treads been so widespread and diversified.

The introduction of the Feralun anti-slip tread in 1909 was a notable event in this field. Now it is the adopted standard of the heavy passenger carrying public utilities, such as the Interborough Rapid Transit Co., the Boston Elevated Ry., Chicago Surface and Elevated Lines, Philadelphia Rapid Transit Co., etc., while in the industrial field there is scarcely any progressive corporation that is not using it advantageously.

An additional type of anti-slip tread is announced by the American Abrasive Metals Co. It is called "Vulcalun," being a combination of vulcanized rubber and abrasive in similar form to the combination of iron and abrasive in the Feralun tread.



Vulcalun as applied to stairs and floor levels

Vulcalun is quite light in weight, being only about one-third that of Feralun. Moreover, it is an effective insulating material, and will be especially desirable around high tension switchboards, etc. As a floor covering around turret lathes and other machinery where the floor becomes slippery, Vulcalun will provide a very durable and effective friction surface absolutely unaffected by water, alkalies, acid, etc.

When it is considered that there are 7,372 people killed by automobiles, street cars and fires all combined and 7,590 by slipping, tripping and falling other than from poles, ladders, out of windows and over precipices, the introduction of Vulcalun will be appreciated by safety engineers. It will be exhibited at the National Safety Council Exposition in Cleveland, where those interested may become fully acquainted with it.

THE LUNGMOTOR

There are more lives lost each year here in our own country through drowning, asphyxiation from smoke fumes or gases, electric shock, collapse during anaesthesia, narcotic poisoning and asphyxiation of new-born babies than the American forces lost in battle during the entire period of the war. It is safe to say that a large majority of these lives could be saved by the immediate use of a resuscitating device. A device that can be operated by anybody and not one that needs an expert to operate, as much valuable time is lost waiting for an expert.

There is no danger of injuring the most delicate of lung tissue with the Lungmotor, it is a simple, safe and easy to operate resuscitating device. If by chance the operater should work the device violently under stress of excitement, the safety regulators on the front of the Lungmotor prevent any possible excessive pressure to be created in the lung. The construction of device, operating on the principle of tidal air volume, prevents any suction action on the lung.

The Lungmotor Company, 711 Boylston Street, Boston, Mass., state Lungmotors are in use by the United States Government and Allied Governments, the American Red Cross, and over 5,000 cities, hospitals, industries, public service companies all over the world. A booklet entitled "The Lungmotor and the Need of It" describes and illustrates its use and operation. Write the Lungmotor Company for a copy.

PERFORATED METAL FOR MACHINE GUARDS

The making of suitable and proper machine guards has to some extent taxed the ingenuity of many mechanics. An eighteen-page book on machine and belt guard building has been issued by the Harrington and King Perforating Company of Chicago. It is generously illustrated showing the many ways which perforated metal can be used to overcome difficult machine guard problems. This book also shows how perforated metal with the aid of angle bands and gussets can be fabricated into neat, strong stock racks and shelving. Those interested can secure copies from the above mentioned manufacturer.

THE G. P. & F. SAFETY GUARD

Invention is proverbially born of necessity, and it was the search of the Geuder, Paeschke & Frey Co., of Milwaukee, for absolute protection of their forming and punch press operators that resulted in the manufacture of the G. P. and F. Safety Guard.

The manufacturers are using their own device every day on over two hundred presses, so they can offer it to others with the conviction that it will insure the safety to others that it does to them.

Three years of constant, hard use proved that the guard is reliable, strong and simple.

This "safety guard" is recommended especially for stamping and forming operations where the workman has to take each piece singly, lay it on the die with his hand, being

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then supposed to remove his hand before stepping on the treadle.

In operating the press, a gate descends in advance of the die, so that if the gate in descending struck the operator's fingers or his hand, the clutch would not operate.

Instead of lessening the output of work, this device increases it, as the operator quickly realizes the absolute safety afforded and can work faster on account of his freedom from excessive caution.

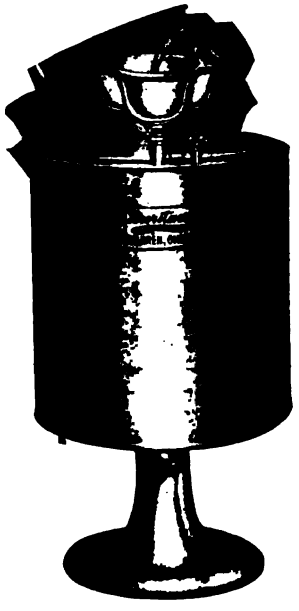
A descriptive circular is available for general distribution among those concerned with "safety."

"WEISTEEL" IN CLEVELAND

Although the Henry Weis Mfg. Co. of Atchison, Kans., will have no exhibit at the Grays' Armory during safety week, they maintain regular Cleveland headquarters at 360 Leader-News Building, in charge of Mr. G. B. Wolin. Visitors to this office can inspect models and secure all other information.

PURITAN CANTONMENT COOLER FOUNTAIN

The Halsey W. Taylor Company, of Warren, Ohio, is marketing a cooler fountain which is furnished with a new Puritan fountain head known as the "2 stream converging mound builder projector." This fountain head was designed to meet the demand of the government, during the war, for a better and more sanitary drinking equipment for army cantonments and naval training stations.



The Puritan Cantonment Cooler Fountain

The principle of the "2 stream" is that an interference is set up in the stream which retards the movement of the water at the apex of the arc. This not only produces a practical drinking mound, but lessens the danger of the water being projected out of the receptor, if the pressure is varied. The "2 stream" is set in a cast-iron vitreous enameled bowl, with a ventilated tripod guard cast integral, so constructed that the sensitive part of the drinker's lips cannot come in contact with same. The manufacturer states that this fountain head was adopted, approved and specified by the government for all cantonments and naval training stations.

The illustration shows the Puritan Cantonment cooler fountain equipped with the "2 stream" fountain head. The body of the tank and coil guard is made from galvanized sheet iron. Re-granulated cork is used for insulation in the side walls and pressed cork board in the bottom and cover. The cooling coil is made from ½" O. D. No. 20 gauge seamless brass tubing, tinned both inside and out. The cover is equipped with an air-tight gasket and locking device to prevent tampering.

Further particulars can be obtained by addressing a request to the manufacturer.

"THROUGH THE MESHES"

Under the above title, The W. S. Tyler Co., of Cleveland, publish a little booklet which is extremely readable and of which the August issue has recently reached us.

The bulk of the matter is of general interest and only incidentally is introduced the subject of the wire cloth, which has spread the fame of this large concern.

Safety Engineers are interested in wire cloth principally as a material with which to build protective screens and guards.

Personal fancies are well served by The W. S. Tyler Co., as their product ranges from a mesh through which only an impalpable dust may pass, to one coarse enough to grade such materials as coal or stone. A variety of metals is offered in the smaller sizes, and the galvanized wire cloth is given so heavy a coating of spelter that its resistance to wear and age is unusual. The inquiries of safety engineers are now sought.

NEW GENERAL SALES MANAGER FOR EDISON STORAGE BATTERY COMPANY

John Kelly, who for a number of years was New York district manager of the Edison Storage Battery Company, has been appointed General Sales Manager of the Company, with headquarters at Orange, N. J. This promotion for Mr. Kelly follows closely upon his promotion, on July 1 of this year, to the position of Assistant General Sales Manager.

Mr. Kelly brings to his new position the experience of a long and varied career in the storage battery, electric vehicle and accessory business. For nine and one-half years he was district manager of the New York office of the Edison Storage Battery Company. Before that he had been a salesman for the Westinghouse Storage Battery Company for two years, for the Swinehart Tire & Rubber Company for three years, for The Firestone Tire and Rubber Company for two years, and for the New York Edison Company for nearly four years.

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GLAUBER, A PIONEER NAME IN SAFETY THROUGH SANITATION

The drinking fountain has come to light within the past 10 years and improvements have rapidly been made so that in the installation of a modern factory, the up-to-date safety engineer would no more think of planning a factory without the latest sanitary equipment than he would think of forgetting to install electric wiring. It is a necessity to safeguard the health of the employes, and in the present day it is absolutely necessary.

In many factories where tests have been made the record shows that where there are many drinking fountains installed that have an attractive and appetizing appearance there is a natural tendency to take a drink of clear, cool water. Medical journals all agree that the person who drinks plenty of water is usually the healthiest individual. An employe in good health will naturally produce more and better work, and this reacts so that the installation of drinking fountains has meant a better and healthier class of employes.

Formerly in equipping a factory with sanitary plumbing the plumbing contractor was content to use the ordinary type of faucets that were designed for home use, as no special attention had been paid to specially designed equipment for factory purposes, but with the spread of various contagious diseases amongst factory employes it became evident that there was danger lurking in the ordinary wash sinks and the Glauber Brass Manufacturing Co. were one of the first concerns to make a study of these conditions and make up special designs to meet all requirements of factory conditions.

Several years ago one of the largest factories in this country had an epidemic of skin trouble affecting the employes of one of their departments which employed two or three hundred people. The fact that all the trouble seemed to be in one department naturally caused this concern some anxiety and an expert, in making a survey of the sanitary conditions, discovered that all these employes were washing in wash basins that used the ordinary rubber stopper. One of these employes that originally came into this department had eczema and washed in these basins and the scum which remained and adhered to the bowl, even after the rubber stopper had been pulled, was waiting for the next bowl full of water and the germs from the first user were transmitted to the next man, with the result that practically the entire department had eczema before many weeks were over. In this instance the Glauber Manufacturing Co. immediately recommended that they eliminate all rubber stoppers and use a bee-hive strainer instead of a stopper so that there be absolutely no possibility of using a stopper or anything to hold the water in the bowl, practically compelling every man to wash in running water.

The idea of "washing in running water" is to prevent any spread of contagion of skin diseases of any kind, and to meet this particular condition various types of factory equipment were designed and manufactured, meeting the conditions of the largest and most progressive factory in the United States.

NEW WELDING GOGGLE

The bending of a reed before a wind that would uproot an oak, the throwing of a plate on a feather bed without breaking it, are familiar illustrations of the principle which is used by the New York Eye Shield Co. in the design of their new welding goggles which are marketed under the name of "Eye Delite."

The lenses which are double and replaceable are held in place by a spring which yields upon pressure so that when a flying particle hits the surface there is no rigidity and therefor greatly reduced tendency to breakage.

The frame of the goggles is of composition with a very low conductivity of heat, the bridge being a simple strap of rawhide is easily adjustable to fit and there is not a screw or any other particle of metal to conduct heat to the wearer. Lenses of any degree of shading may be supplied, some of these such as are used with electric welding are almost opaque to ordinary light.

THE SAFETY OF WIRE GLASS

Although approved wire glass such as is made by the Western Glass Co., of Streator, Ill., has been generally recognized as an efficient retardant to the spread of fire, there are other safety features which are not often enough considered.

(*Continued on page* 188)

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AMERICAN SOCIETY OF SAFETY ENGINEERS RECEIVES REPORT OF REORGANIZATION COMMITTEE

The special meeting called by the American Society of Safety Engineers for the purpose of receiving the report of the committee appointed to consider the plan and scope of reorganization, was held in the United Engineering Building New York on the night of September 12th. The attendance was a most representative one, comprising at least two of the executive committee of the National Safety Council and also visitors from as great a distance as Akron, Ohio.

The meeting was called to order by President Van Horn who briefly stated the object of the meeting and turned it over to Mr. H. W. Mowery, chairman of the committee on reorganization.

Mr. Mowery read a very comprehensive report outlining the vast amount of work which had been accomplished since the last meeting of the society and telling of the support which he had received from all sections of the country and all elements of the safety field.

This report was unanimously accepted on motion of Mr. Spencer, but in order that the society might be fully aware of exactly what it was doing, Mr. Mowery asked that two more motions be put, one that the society should definitely commit itself to the new object which was printed in the last issue of SAFETY ENGINEERING and secondly, that the means of securing this object as expressed in article two of the new constitution be approved. These two motions were unanimously carried and it then seemed proper that a nominating committee should be appointed, which President Van Horn did; naming Messrs. Whalen, Spencer and Hoffacker. This committee was instructed to report by September 17th, and the secretary was ordered to mail ballots by September 20th to all members entitled to vote so that these ballots could be acted on at the next meeting September 26th.

Mr. Mowery was then asked to read the draft of the partially finished constitution and by-laws, and while these are still incomplete in several details they show that plans are being made for an engineering society along the broadest and most professional lines.

The matter was then thrown open for discussion and general comment and it was suggested that plans be made to obtain cooperation of the National Safety Council at the coming convention in Cleveland. Mr. Whalen, chairman of the nominating committee, stated that the new officers would probably be elected before that time so as to give them an opportunity to direct this work.

As Mr. W. L. Fursman of the Willys-Morrow Company and other Willys' interests was present, he was asked to take the floor and told in a very entertaining manner the need that he had felt of a national society of safety engineers and the efforts that he had made in attempting to organize one. He announced himself as having relinquished to the existing society all that he had done and intended to work with it to the best of his ability.

Mr. W. N. Fitch, safety engineer of the Goodrich Rubber Company, Akron, Ohio, spoke of the need of national standards of safety which could only be secured by a national society. Mr. Fitch commended the high requirements of membership proposed, stated that in his plant safety had become a recognized engineering factor and that every blue print was approved by safety engineers before construction commenced. He was asked if the existing Ohio society might affiliate as a state local of the national society and personally saw no objection to the same.

Mr. R. M. Little, director of the Safety Institute of America stated that his present thought was that the new organization cound count upon the active co-operation of the Safety Institute.

Mr. Lew R. Palmer, director of Safety and Personnel of the Equitable Life Assurance Company and past president of the National Safety Council also was present. He took no active part in the discussions but at the close of the meeting he assured the committee that he thought there was a real function for the Society which if conducted along the lines of the new constitution should not conflict with the National Safety Council.

The next meeting will take place on September 26th. At this time the constitution and by-laws will have their second reading and will probably be accepted. The membership has been asked to constitute itself as a committee for securing new members of known engineering qualifications and they are earnestly requested to report as many new applications as possible between now and September 26th.

Following are extracts from letters received:

H. P. Heyne, Safety Inspector, United Alloy Steel Corp., Canton, Ohio—"I am heartily in accord with the movement for the adoption of a new constitution. You may consider the writer a member in the reorganized society."

E. F. Lingemann, Supervisor of Labor, Hudson Motor Car Company—"It seems to me this a very important move. You can use this letter as my application for membership."

Mr. A. L. McKee, Mgr., Compensation Claims, the Standard Parts Company—"I believe the need of an oragnization of Safety Engineers is very necessary at this time. I shall be glad to become a member if and when reorganized."

J. Albert Robinson, Research Engineer, Federal Board of Vocational Education—"I just want my name registered as one who desires full membership in your society if reorganized along the proposed lines.

W. N. Fitch, Director, Department Accident Prevention and Sanitation, B. F. Goodrich Rubber Company—"I assure you that I am much interested in any propaganda which has to do with the elimination of injuries."

G. E. Sandford, General Electric Company—"Will you consider this letter as an application for membership in your society as outlined in SAFETY ENGINEERING."

G. T. Fonda, General Supervisor, Bethlehem Steel Company—"I wish to assure you that I am in sympathy with this movement."

Many more letters were received the publishing of which is impossible through lack of room."

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(*Continued from page* 186.)

The modern industrial building is designed with as great a glass area as is possible and the percentage of light yielding surface in walls and roofs is very large. In all industrial communities there is danger of nearby explosions, either from some material necessary to use or from a steam boiler. Common glazing is a very serious source of danger under such conditions whereas with wire glass no shattering can take place and when the most serious breakages occur the pieces are securely held together. The coming of the aeroplane introduces hazards from above against which wire glass should form the most effective means of protection.

TRANSPARENT SIGNS

The numberless locations demanding safety-signs afford occasion for the use of every character of material in their manufacture.

Very attractive are the transparent signs made by The United Service Company of 1900 Euclid Avenue, Cleveland.

When applied to glass they are translucent resembling decalcomanie but they are equally adapted to opaque surfaces where permanence is desired.

A great many of these signs have been used in the interior of railway cars where they are applied to cabinet wood work without detracting in any way from its elegance.

CATALOGS WANTED

We are in receipt of a communication from Mr. J. J. Kennedy, Safety Engineer, Member District No. 1, Safety Board, P. O. Box No. 1474, Spokane, Wash., stating that he would like to be placed on the mailing list of firms and manufacturers handling all articles relating to safety.

Inasmuch as Mr. Kennedy's wants are so general we are presenting them in this manner rather than through correspondence.

UNDERWRITERS' LABORATORIES

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examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

ARMORED CABLE—Pratt Chuck Co., The, Mfr., Frankfort, N. Y.

BUSHINGS—Thomas & Betts Co., Mfr., 63 Vesey St., New York, N. Y.

CABINETS AND CUT-OUT BOXES—SHEET METAL—Electric Steel Box Co., Mfr., 551 W. Monroe St., Chicago, Ill.

CABINETS AND CUT-OUT BOXES—SHEET METAL—Electrical Mfg. Co., The, Mfr., 4149 E. 79th St., Cleveland, Ohio.

CABINETS AND CUT-OUT BOXES—SHEET METAL—Sprague Electric Works of General Electric Co., Mfr., 527-531 W. 34th St., New York, N. Y.

CARTRIDGE FUSES—Atlantic Electric Goods Co., Inc., Submittor, 1168 Broadway, New York, N. Y.

CONDUIT BOXES—Adapti Mfg. Co., The, Mfr., 919-25 West St., Cleveland, O.

CONDUIT BOXES—Pratt Chuck Co., The, Mfr., Frankfort, N. Y.

COUNTERBALANCED STEEL ELEVATOR DOOR—Barry Fire Door Co., Mfr., 4235-41 Ogden Ave., Chicago, Ill.

ENCLOSED SWITCHES—Square D Co., Mfr., Detroit, Mich.

EXTINGUISHER, 2½-GAL. PUMP TYPE—Diener Mfg. Co., Geo. W., Mfr., 400 Monticello Ave., Chicago, Ill.

FIRE PAILS, 12 QT., WITH AUXILIARY DIPPER—Standard Fire Extinguisher Mfg. Co., Mfr., 2115 Chicago Ave., Minneapolis, Minn.

INSIDE HAND-OPERATED, DISCHARGE DEVICES—Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

INSIDE POWER-OPERATED DISCHARGE DEVICE—Farr Hydraulic Systems, Mfr., David Whitney Bldg., Detroit, Mich.

MEDIUM BASE SOCKETS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

MEDIUM BASE RECEPTACLES—Crouse-Hinds Co., Mfr., Syracuse, N. Y.

MEDIUM BASE SOCKETS—General Electric Co., Mfr., Schenectady, N. Y.

MOGUL BASE SOCKETS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

MOGUL BASE SOCKETS—General Electric Co., Mfr., Schenectady, N. Y.

OIL BREAK SWITCH—Electric Service Corp., Mfr., 511 Sutter St., San Francisco, Cal.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—STAGE TYPE—Universal Electric Stage Lighting Co. (Kliegl Bros., Proprietors), Mfr., 240 W. 50th St., New York, N. Y.

REDUCING VALVES, HIGH-PRESSURE GAS—Universal Regulator Co., Submittor, 775-79 Communipaw Ave., Jersey City, N. J.

RESISTANCE APPLIANCES — Cutler-Hammer Mfg. Co., The, Mfr., Milwaukee, Wis.

SHEET METAL FIRE WINDOW MULLIONS—Lawton-Stephens Co., Inc., Mfr., 1270 Broadway, New York, N. Y.

SHEET METAL FIRE WINDOW MULLIONS—Pruden Co., The, C. D., Mfr., Warner, Dock and Bayard Sts., Baltimore, Md.

SLIDING AND SWINGING, TIN-CLAD, FIRE WALL DOOR—Atlas Fireproof Co., Mfr., 247-249 Calyer St., Brooklyn, N. Y.

SWEEPING COMPOUND—Standard Chemical Co., Inc., Mfr., P. O. Box 643, Houston, Tex.

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Safety Engineering

Vol. 38 OCTOBER, 1919 No. 4

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RALPH C. RICHARDS,
Fifth President, National Safety Council

Mr. Richards is chairman of the Central Safety Committee of the Chicago & North Western Railroad. If he is not the "Original Safety Man" in the United States other claimants for that honor remain silent

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Eighth Annual Safety Congress of the National Safety Council

Cleveland, Ohio, October 1, 2, 3 and 4

ALTHOUGH beginning on Monday, September 29, when the Safety Exposition in the Grays' Armory opened, crowds had been gathering, the safety clock ticking and the exposition attracting, on Wednesday, October 1, a decided change was noticeable. The lobby of the Hotel Statler was almost impossible with delegates and luggage. Identifying badges had been issued to facilitate recognition, and on the mezzanine floor, where the registrations were made, Buell Nutt sat at the hard job of trying to seat every would-be banqueter at a table directly in front of the speakers. All were enjoying so thoroughly the meeting of old friends that it was with difficulty that they were gotten into the ballroom soon after 10 o'clock, when President Van Schaack, escorted by C. W. Price and S. J. Williams, ascended the platform.

OPENING THE CONGRESS

Dr. F. Q. Blanchard of Cleveland opened the congress with prayer. On account of the impossibility of Mayor Davis being present, the welcome by the city of Cleveland was delivered by the Hon. Floyd E. Waite, director of parks and public buildings, and chairman of the public safety committee that is being formed to continue permanently the safety measures introduced during Safety Week.

This welcome was acknowledged gracefully by President Van Schaack.

A quorum being present, obviously, the calling of the roll was dispensed with and Messrs. Davidson, Stanion and Case were appointed tellers of elections.

The presidential address was comprehensive, covering past performances and the hopes for future work. It featured schools for foremen, public safety movements and the importance of education through the preparation of text books on safety, etc.

REPORTS OF COMMITTEES

C. W. Price reported as general manager, remarking that he had followed Mr. Cameron's example, having published his report in the weekly news letter.

C. P. Tolman, chairman of the committee on business and administration, said that the general manager's report had covered his activities. He told of the enthusiasm and efficiency in the Chicago office of the council.

The report of the committee on internal developments was made by H. H. Robertson. The committee, he said, acted as a planning committee; some of the plans submitted included increase of membership, establishment of local councils, sections, industrial relations, and a health service program.

As F. L. Hoffman, chairman of the committee on public co-operation, is in Europe, C. M. Talbert of St. Louis made the report, which was brief; the committee's work would be revealed in the section meetings.

The report of the committee on service to members was made by F. P. Sinn, who said that the safe practice pamphlets had been improved by R. J. Young, and his co-workers, sectional pamphlets had been produced and many more would follow. In all 177 general and 312 sectional bulletins had been issued. Sections can get more bulletins by furnishing more data. Cataloging of the bulletins is completed. The weekly letter had

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SHARP CURVE
"LOOKIT, MABEL, I'M GOING TO TAKE THIS TURN AT 35 - "
"LET'S SEE THE FIREWORKS!"
DANGER BLASTING!
"OH I WON'T NEED MY COAT, MOTHER - OLD FLU DOESN'T WORRY ME ANY -"
"ROCK-A-BYE SHIMMY - HAW HAW - GEE YOU LOOK SCARED, DOTTIE!"

THIS IS SAFETY WEEK - LET'S STOP TAKING CHANCES

Cleveland Press, Sept. 29

Undertaker's Delight

been enlarged. Films and lantern slides had been furnished for the cost of shipment; phonograph records had been furnished also.

The committee on education, reporting through A. W. Whitney, chairman, said that it had prepared a pamphlet for universities on principles and practice of safety, also syllabi of lecture courses on industrial management. Part of its university service is furnishing lectures on safety. Thirty-four universities and technical schools had promised to use the pamphlet. Mr. Whitney said that as a general session on Saturday, October 4, would be devoted to the educational subject, it was unnecessary to go into the matter at length in his report, adding that the National Educational Association would form a section on safety and that Dr. Payne's book on theory and technique of the St. Louis plan was designed to be placed in the hands of teachers.

At this point H. W. Forster observed that he thought the general manager should give the members some idea of the growth of the council. General Manager Price replied that the membership had reached 3,761, employing 6,275,000 workers.

C. P. Tolman was asked to make the report for the resolutions committee and he yielded to A. T. Morey, who offered a resolution of thanks to all who had contributed to the Cleveland meeting, mentioning the mayor, the city departments, the mayor of East Cleveland, the late Mr. Cook, mayor of Lakewood, the Chamber of Commerce, the convention bureau, Cleveland Advertising Club, Col. Fuller, U. S. A., the public and parochial schools, the Woman's Club, Boy Scouts, churches, Auto Club, police and fire departments, the daily press, Messrs. S. W. Tener, A. H. Lintz, Oscar McNab, Buell Nutt, President Schaack, W. H. Cameron, C. W. Price and the headquarters staff.

Mr. Tolman offered a number of resolutions, revising sections of the by-laws to make them harmonious as a whole.

NEW OFFICERS AND DIRECTORS

George E. Morgan, reporting for the

Cleveland Press, Sept. 29

And It Happened About Like This

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THE "JAYWALKER" IS USUALLY THE BLASE CITY CHAP—
RED CARS MAKE THIS PEDESTRIAN HIGHLY DANGEROUS!!
STOP
"HOW DARE you tell me to stop!"
TRAFFIC RULES MEAN NOTHING TO HIM!
THE TIGHT-SKIRTED, HIGH-HEELED YOUNG LADY SIMPLY HAS TO BE HUMORED!
THIS IS SAFETY WEEK— HELP MAKE THE STREETS SAFE

Cleveland Press, Oct. 2

The Dangerous Pedestrian

nominating committee, named the following directors for three years:

David S. Beyer, vice-president, Liberty Mutual Insurance Company, Boston.

*L. H. Burnett, assistant to the president, Carnegie Steel Company, Pittsburgh.

W. H. Cameron, manager, industrial relations, Eastman Kodak Company, Rochester.

C. L. Close, manager, Bureau of Safety, Sanitation and Welfare, United States Steel Corporation, New York.

*Robert F. Coleman, director of personnel, Pierce Arrow Motor Car Company, Buffalo.

J. B. Douglas, manager, claim department, United Gas Improvement Company, Philadelphia.

*A. F. Duffy, chief of safety section, United States Railroad Administration, Washington.

Dr. Otto P. Geier, manager, employes service department Cincinnati, Milling Machine Company, Cincinnati.

*Ishaiah Hale, safety superintendent, Atchison, Topeka & Sante Fe Railroad, Topeka.

Julien H. Harvey, The Bracken Company, Kansas City.

Dr. F. L. Hoffman, statistician, Prudential Insurance Company, Newark.

Arthur T. Morey, general manager, Commonwealth Steel Company, Granite City, Ill.

*B. W. Nutt, Strong, Kennard & Nutt Company, Cleveland.

Lew R. Palmer, director, safety and personnel, Equitable Life Assurance Society, New York.

R. P. Richards, chairman, central safety committee, Chicago & North Western Railroad, Chicago.

H. H. Robertson, president, H. H. Robertson Company, Pittsburgh.

Francis P. Sinn, assistant to vice-president, New Jersey Zinc Company, New York.

*Philip Stremmel, National Enameling & Stamping Company, Granite City, Ill.

Stephen W. Tener, manager, accident and pension department, American Steel & Wire Company, Cleveland.

E. G. Trimble, manager, Employers Indemnity Exchange, Kansas City, Mo.

James E. West, chief scout executive, Boy Scouts of America, New York.

Arthur Williams, president, Safety Institute of America, New York.

H. M. Wilson, The Associated Companies, Pittsburgh.

Mrs. Joseph R. Wilson, Albuquerque, N. M.

J. M. Woltz, safety director, Youngstown Sheet & Tube Company, Youngstown, Ohio.

*New directors.

The secretary was directed by motion to declare the above elected, and they were credited with having received 1,973 votes each.

ENGINEERING SECTION

Under new business, R. M. Little offered a motion to form an engineering section, for which a need was recognized. He suggested that the section be open to members of the A.

Cleveland Plain Dealer, Oct. 2

Safety First

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Cleveland Press. Oct. 3

Teaching Us the A B C of Safety

S. C. E., A. S. M. E., A. I. E. E., Mining and Metallurgical Engineers, and American Institute of Chemical Engineers, requiring 10 years of engineering work, with 5 years in responsible charge and recognizing a degree in engineering equivalent to 2 years' experience; associates to be of similar grade in the other societies, with the same credit for degree; the secretary to be a member of the engineering staff of the council with an executive committee of 25 members. The new section to work in conjunction with the Underwriters' Laboratories and the Bureau of Standards, to hold one or more meetings at the annual congress. A committee to perfect organization was asked.

H. W. Forster said that he was unprepared to vote on such a plan and suggested an acceptance of the principle rather than the plan. The motion as amended by Mr. Forster was adopted after a discussion.

MEMBERSHIP CAMPAIGN

The chair announced that for work in connection with the membership campaign, gold, silver and bronze medals had been awarded as follows:

Gold medal: H. T. Heyne.

Silver medals: G. E. Clarkson, secretary, Western Pennsylvania Division, N. S. C.; F. L. Felmer, Central Mississippi Valley Division, N. S. C., St. Louis; A. H. Lintz, secretary, Northeastern Ohio Division, N. S. C., Cleveland; L. A. DeBlois, R. T. Read.

Bronze medals: C. Parker, R. C. Paul, T. H. Boyd, A. W. Donald, J. H. Harvey, W. L. Meyers, R. A. Shaw, A. B. Sherlock.

1920 CONGRESS

An invitation from Indianapolis to hold the next congress was read and the session adjourned.

"THE SMILE PARTY"

"A little nonsense" was relished so keenly by the great representation at the Winton on Thursday night, October 2, that it proved safety delegates to be of the "wisest of men."

It was Buell Nutt's chef d'oeuvre,

Cleveland Plain Dealer, Oct. 3

Safe on Second

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A Part of the National Safety Council Banquet Which Filled Adjoining Rooms and Corridors

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and when it was started it certainly went of itself; in fact, the only running needed was a slight pressure on the brake.

Topical songs were sung and all the popular airs led by a master singer who had all of Rodenheaver's skill in extracting songs from those who never sang before.

All the professional entertainers were good, but the real fun came from the members themselves and was of a kind that can be produced only by the wearing of a paper hat.

One of the pleasant innovations of the "smoker" was the presence of the ladies, but—don't jump—they didn't smoke.

THE BANQUET

With the grand ballroom of the Statler filled and with overflow tables placed in the foyer and the corridors, the annual dinner Friday evening, October 3, was a success before it started. An excellent entertainment was provided, including an artistic rendering of old songs by a quartet costumed appropriately and by candle light. Popular songs were sung by the guests. Time passed rapidly to the coffee, when S. W. Tener, president of the Northeastern Ohio Division, welcomed the council to Cleveland, a city of diversified industry, humorously coupling pig iron and peanut butter, telescopes and chewing gum, clerks and shock absorbers, electric lamps and insect exterminators, etc. Mr. Tener gave all credit to the local committee, mentioning Oscar McNab as its head. He pointed out the growing influence of women in the council, announced that a women's section had been formed, and that Miss Kathryn Hunt, who had acted as assistant treasurer, had been elected treasurer.

The chairman yielded to Alexander C. Brown, who acted as toastmaster. Mr. Brown spoke on the ultimate result of the safety movement, the humanizing of industry, and introduced James Speyer, treasurer of the Safety Institute of America.

Mr. Speyer's subject was "Teamwork in Safety." He argued that the large percentage of rejections by army examinations revealed something wrong with our social structure, and he spoke of the final achievement of a rule of order and peace.

Mrs. D. S. Beyer ("Marie Conde" of the Metropolitan Opera Company) recited her poem "Safety Last," which was recently published in SAFETY ENGINEERING, and sang exquisitely Charmant Oiseau, from Perle du Bresil, which gave the audience an opportunity to hear her great ability in coloratura effects.

Although Robert W. Campbell was slated for a speech on "Safety, the Pioneer," his place was taken by the new president, R. C. Richards, who was greeted with great applause and the waving of napkins. In the course of his speech Mr. Richards mentioned the formation of the new educational section and the broad plans that were being made for the extension of all of the council's work.

Then a few more professional entertainers. With the singing of "America," the banquet was at an end.

CONVENTION HIGH LIGHTS

Employes' Representation

The general session on Wednesday afternoon, October 1, was one of the best attended and most spirited of the entire congress. Conducted by Arthur H. Young, it was opened by Cyrus McCormick, Jr., of the International Harvester Company.

Mr. McCormick described the operation of the representative plan adopted during the year in the plants of his company. The point he drove home was the necessity of going into a plan of this kind honestly; when the voting power is given to the men their decision should have the proper weight and not be subject to veto by the management if the decision went against the previously formed opinions of the executives. Mr. McCormick said that no restrictions should be placed on who should be elected as representatives of the men. Any necessary discrimination should be

(*Continued on page 244*)

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Is Industrial Death Necessary?

By Lucian W. Chaney

United States Bureau of Labor Statistics, Washington, D. C.

Proceedings of the Eighth Annual Safety Congress

THIS is a serious question. A negative answer is greatly to be desired. If such an answer is ever to be obtained it will be because the safety men of the country have faith in its possibility and energy, according to their faith. I am very glad, therefore, to have the opportunity to press upon your attention my conviction that no less an ambition is worthy of the achievements and capacity of American safety men.

Consider your record for a moment. What have you done already? In 1907 the severity for the iron and steel industry was not less than 21.6 days per worker; in 1910 it was 15.9; in 1913, 13.9; in 1917, 12.2 days. It should be remembered that this last figure, though not much below the preceding high point in 1913, was secured under the enormous difficulties of war conditions.

You have established a descending series which if it can be maintained even at a lessened speed will approach the zero line. A preliminary figure for 1918 shows 10.9 days.

This downward trend is even more convincingly indicated when 5-year periods are considered. The 5-year period ending with 1911 had a severity rate of 15.0 days, while the 5-year periods ending in 1916 and 1917 had each a rate of 11.0 days. Blast furnaces, one of the most hazardous departments of the iron and steel industry, show a steady decline from 31.9 days in the period ending with 1911 to 16.7 in the 5 years terminating in 1917.

This is a good record. Can it be continued, perhaps accelerated? I am here to urge that it can and to indicate what I regard as one of the important means to that end.

FREQUENCY RATE—CARELESSNESS

Very early in my contact with the industrial accident problem two impressions began to harden into convictions. They were: (1) that the accepted method of estimating industrial hazard by means of a frequency rate was wholly inadequate, and (2) that the factor of personal "carelessness" was being overstressed very greatly. As a result of the first convicition I made an elaborate study in my first extended publication of the time lost through temporary disability. Since the deaths and permanent injuries were excluded this compilation had very little significance. From this point severity rating has progressed, due largely to the efforts of the United States Commissioner of Labor Statistics to the development of what may fairly be regarded as a standard system. This system is now used by the International Association of Industrial Accident Boards and Commissions and is recommended by the statistical committee of the Council.

As a result of the second conviction I attempted, immediately on the working out of a system of severity rating in the Bureau of Labor Statistics to apply it in testing the relative effect of efforts directed toward the men and those which I included under the designation, "engineering revision."

CONDUCT OF THE MEN

It is evident, on a moment's consideration, that certain classes of accidents are much influenced by the conduct of the men while others are more removed from their control.

I first found that in cases, such as the handling of objects and tools, where the conduct of the men was clearly a very influential factor that the frequency rate was normally high, but the severity rate was comparatively low. Following the matter from year to year showed that very often a notable decline in frequency might be accompanied by stationary or even rising severity. This means that the result of effort directed to the be-

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havior of the men is influential mainly in diminution of minor accident and may be accompanied by an actual increase in accident cost.

I then considered such causes as showed marked severity and which, in the course of time, had a considerable decline. I found, without exception, that a conspicuous decline in severity could be correlated with definite engineering improvements. It is worth while to put some emphasis on this point. I have been diligently looking for some years for a case of important saving in accident cost which was not related to "engineering revision." I have not found one.

Let me illustrate: In blast furnaces, under the old conditions, "breakouts" of molten metal were distressingly common and often accompanied by serious losses of life. With improved construction in a well-built modern furnace, such events are of rare occurrence.

In a group of blast furnaces with which I was particularly familiar it was possible to trace step by step an improving severity in deaths from asphyxia and the structual changes to which it was evidently due.

In open hearths the cause most prolific in deaths in the earlier days were cranes and hoists, molten metal and power vehicles. Here, too, it was possible to trace with perfect definiteness the parallel course of "engineering-revision" and a declining severity rate. Singularly enough, in the particular group of open hearths used for purposes of study, the frequency rate in the handling of objects and tools markedly decreased but severity *increased*.

Nowhere was a decline in the severity rates more clearly to be attributed to engineering change than in yard operation The provision of adequate clearances, the elevation of tracks, the construction of viaducts and subways, improvements in methods of transporting hot metal, these and many other changes conspired to bring about a more satisfactory condition. Nothing at all comparable with the reduced severity due to these changes could by any stretch of the imagination be attributed to the exercise of greater personal care.

Tracing conditions thus from department and finding that marked saving in accident cost was always associated with more or less definite engineering improvement was suggestive if not convincing.

THE DEATH RECORD

Since death is the great element in accident cost it becomes significant and important to examine the death record.

It was possible to do this in 372 cases. It was found that in 57 per cent. of these some engineering remedy was suggested after the death. A group of 72 cases of later date similarly analyzed showed 58 per cent. might have been saved had it been possible to apply the remedy in advance.

I have elsewhere pointed out that there are two elements of weakness in this study. They are: (1) the material considered is to a considerable degree of an early date when the safety movement was beginning and when the conditions would naturally favor the discovery and remedy of a high proportion of engineering defects and (2) the judgment of my colleague in the Bureau of Labor Statistics and myself might have been at fault in studying the individual records. It was necessary to take these records as they stood. No correction or amplification of them was possible.

I determined therefore to examine some extensive records in which safety committees had set down their judgment regarding the accidents coming under their jurisdiction. These studies had been made with very great care and with every opportunity to correct imperfect records and secure all the data which could shed light upon the cases.

The results of this effort to let the safety committees speak for themselves was published in the *Monthly Labor Review* for December, 1918.

The committees had gone on record concerning 1,642 cases during a period of 3 years. The analysis is most suggestive. The committees found that, while but 7 per cent. of all injuries were amenable to engineering revision, 57 per cent of deaths and major mutilations could, in their judgment, have been prevented by proper engineering measures.

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It is a rather striking coincidence that this is precisely the same percentage which was assigned by my colleague and myself to this group.

DEATHS AND MAJOR MUTILATIONS

Turning now to deaths and major mutilations numbering 207, of which 68 were included in the tabulation just considered, I found that the committee had reached the conclusion that engineering remedy was possible in 65 per cent. of the cases. No effort was made to criticise the findings of the committees. The record does not in all cases seem to fully support their final judgment. But in many such cases it is evident that the committee had additional information which had not been incorporated in the summary record.

I have thus presented in barest outline the steps which have led me to my present position on this subject. My conclusions may be summarized in the following statements:

1. The general frequency rate is an index of the prevalence and fluctuation of minor injury. The reduction of this type of injury depends on an educational program whose final effect is to cause the men to do their work in a safer manner. A rising frequency rate may indicate one or all of three conditions: (a) no educational program or a poor one, (b) a good program administered with poor judgment or with insufficient vigor, (c) industrial conditions which might for a time overbalance any program however good.

2. The general severity rate is an index of conditions in regard to death and major injury. The reduction of this type of injury depends in very large measure upon the procedures included in the expression "engineering revision." When the severity rate rises there should be immediately a very searching inquiry for possible imperfection in the engineering program. It is almost certain to be discovered that some unobserved lacks on the engineering side are responsible for the rising rate.

EDUCATIONAL EFFORT

A word about the type of educational effort. I am convinced that what may be termed the evangelistic type goes very largely wide of the mark. Nothing more significant has recently been published on this topic than the letter from a workman in the July number of C. B. Scott's *Safety Bulletin*. I quote: "The safety man depends too much on his talk." "We employes don't need so much safety talk any more." "What we need is more of the *practice* of safety in our plants."

My judgment is this: that our educational effort should be directed primarily to the development of skill rather than caution. The experienced man *is* at times a taker of chances to the point of recklessness. Notwithstanding this he is very rarely hurt as compared with his much more cautious but inexperienced fellow worker who has just come on the job. The evidence on this point is abundant and convincing.

I have also a strong antipathy to much of the safety propaganda because it antagonizes the men. The constant emphasis on "carelessness" as the great factor in accident occurrence is recognized by the more thoughtful workers as being unjust and injurious to them. They resent this improper emphasis.

What stands in the way of an "engineering revision" sufficiently thorough to reduce industrial death a long way toward the vanishing point? In my judgment there is only one thing: The *cost*. I think we have materials strong enough and men skillful enough, but the price seems too great.

I must not be understood as asserting that there is not a limit beyond which industry cannot go in expending money for the prevention of death even. What I do urge is that we have gone, up to the present time, only a little way toward the reasonable limit.

A CHALLENGE TO SAFETY MEN

The condition has in it a challenge to you safety men of America. It is for you to decide whether American industry shall distinguish itself by the breadth and thoroughness with which it applies every known and ascertainable engineering remedy to this industrial death problem.

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Supervision as a Factor in Accident Prevention

By L. A. DeBlois

E. I. du Pont de Nemours Co., Wilmington, Del.

Proceedings of the Eighth Annual Safety Congress

SO long as mechanical, electrical and physical power are applied to meet the needs of industry; so long as chemical reactions go on; so long as we continue to apply these forces human interference with them will lead to human injury. The forces themselves are comparatively simple to understand, and they can be readily enumerated. The manner of their application to each industry, however, runs into thousands, tens of thousands, hundreds of thousands, and perhaps even more.

Now, we have something else to consider in addition to this, and that is the long list of contributory circumstances that may have almost a direct causative effect on injury occurrence. If you will take even the simple example of a carpenter's hammer and try to figure out how many ways accidents can be brought about through its use, you will find no trouble in putting down about 50.

Can we not, therefore, say that in the use of these forces there are 1,000,000 or over 1,000,000 ways in which accidents can happen? If you admit this, what are we going to do? Shall we design 1,000,000 different safeguards, or shall we educate our 35,000,000 working men and women in 1,000,000 different ways of preventing accidents? That is the question.

ENGINEERING REVISION

Turning first to the matter of engineering revision, which I take to mean structural and mechanical betterment, including mechanical guarding, I think we will all agree that up to this time engineering revision has been applied most successfully to these three general matters: (1) to general conditions; for example, space and light. (2) to the guarding and covering of the well recognized and general hazards, such as belts, gears, cutting tools, etc. (3) to the guarding of the more serious hazards which are peculiar to the industry and which naturally attract our attention because they cause serious accidents.

It seems to me quite natural that the effect of the application of engineering revision, especially in the latter case which I have just mentioned, should be to diminish the number of the more serious accidents. But I think we will also admit that this application affords more protection to the conditions of normal operation than to the conditions which arise out of the necessity for repairs, adjustments and accidental or unusual situations. And yet, I fancy that a careful analysis of the majority of our operating plants would show that the payroll hour exposure to accident is about one-third to the abnormal, the two-thirds to the normal conditions of work.

There is another point I wish to make —that is, that the results of engineering revision, whether general or specific, are practically worthless unless followed by supervision, and by continued supervision. For instance, space and light conditions must be maintained, and safeguards must be kept in place and in good conditions. Engineering revision, in itself, is but one form of applied supervision. Engineering revision without supervision is almost impossible of conception.

SAFETY EDUCATION

Turning now to the broad subject of education—safety education as meaning the control of the mental side of the situation as opposite to the mechanical and structural—we find ourselves facing about the same difficulties that we face with engineering revision.

We can, indeed, paraphrase the three

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most successful applications of education to our work, and if so, they will read about as follows: (1) general education, such cautions on the necessity for care, use of, first aid, and so on. (2) special education on frequent, well recognized and general hazards. (3) education on the more serious hazards special to the industry.

This, after all, is the generally accepted program in all safety educational work, and is well-defined in the developed activities of the National Safety Council. I am inclined to believe that our troubles do not come from failure to accept these principles so much as from failure to use judgment in their application.

QUESTION OF RESPONSIBILITY

We have reared our modern system of accident prevention on two axioms: First, that 60 per cent. to 70 per cent. of the accidents are due to the carelessness of the individual (and sometimes the percentage is placed even higher), and the second axiom reads that the foreman is the logical point of attack.

Now, we have all accepted this, we have all seen it in print, and I think we all believe it. But I want to ask you this question: If the employes are to blame for 60 per cent. to 70 per cent. of the accidents, why do we center our attack on the foreman? Your answer is that it is because we can reach the men better through the foreman, and because the men adopt the attitude of the foreman.

Admitted. But if this is true, does it not directly imply an obligation on the foreman's part, and should we not credit him with a definite share of the 60 per cent and 70 per cent of the accidents that we blame on the men? Why not say that half of these accidents could be avoided by getting the foreman in line, and therefore that one-half—30 per cent to 35 per cent—are blameable on the foreman?

Now some one is responsible for the conduct of the foreman. It isn't the employes. It must be the management. If it is responsible for his conduct, it is also responsible for accidents caused by his misconduct or his derelictions. Then why should we not say that this 30 per cent to 35 per cent of the accidents that we would see blamed on the foremen should be blamed not on the foreman but on the management?

You will say "yes," perhaps, to the thought of supervision being effective in lessening accident production, but you will also say that supervision does not remove the cause of the accident. Neither does the application of engineering revision remove the cause. The primary cause of your accidents is the application of power, and you do not remove that *cause* when you surround that machinery with a safeguard.

When it comes to the actual analysis of accidents to determine the responsibility, there is a wide opportunity for divergence. A manager may be inclined to overestimate the blame which should be attached to his employes, while foremen or a safety committee may overemphasize the importance of engineering revision. In point of fact, either engineering revision or better supervision may be remedies of almost equal value.

DIFFERENT CONCLUSIONS

As an example to show the different conclusions that may be reached, let me cite the 207 fatal accidents that Dr. Chaney has just quoted. I merely wish to illustrate how, if you attack the problem from different points of view, you get different results. And, I am going to twist Dr. Chaney's figures to meet my needs. Purely on the basis of the accident descriptions as quoted I reanalyzed the cases and arrived at this:

	Per cent
Fault of employer—susceptible of engineering revision	37
Fault of employer—Lack of proper supervision	34
Fault of injured or fellow employe	22
Unavoidable trade risk	7
	100

This, as you see, puts 71 per cent. of the blame on the management, which is not greatly out of line with Dr. Chaney's 65 per cent., but whereas he has concluded that a total of 65 per cent. is susceptible to engineering revision, I

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find only 37 per cent. so attributable, and believe 34 per cent. can be corrected by better supervision. This 34 per cent. plus 22 per cent. due to fault of injured or fellow-employe almost makes the 60 per cent. we usually blame on the men. I think we are both right, but simply are looking at these accidents from a totally different point of view.

TWO ALTERNATIVES

The solution of this tangle of responsibility lies in the manner in which safety is introduced into the plant by the management. There are two alternatives: Safety may be made a part of the business of production, operation or whatever the function of the business may be; or it may be put on as a sort of a "side-show," endorsed by the management. If it is a side-show it will be conducted by the safety engineer as a separate little enterprise. Some men will be interested, and some will not. There will be meetings, literature and committees, but it will be always regarded by the men as something outside the big tent. The more efficient it becomes, the more will foremen and others look to it and its committees to detect hazardous conditions and have them remedied; the more often it will be said, "That is work for the safety department."

But compare its organization with that of the entire plant with the foreman, for instance. How can so few men detect 1,000,000 defects and 5,000,000 bad practices, apply the remedies and see that they are maintained? Are they in better position to do this than the foremen themselves, provided the latter are aroused to the proper pitch of interest?

Let us trace the alternate course of development. The manager states to his men, "We will not only produce a product in quality, of quantity, and with efficiency, but we will produce it safely. The productive organization will do this. I will require it of my staff. My staff shall require it of my general foremen. He will require it of his foreman, and they in turn of their men. We have a safety engineer, and he will advise us when we ask him, but *we* are responsible for results. Call your men together and explain to them, and I will see that it is followed up."

Safety meetings are called and conducted, not by the safety engineer, though he may arrange the details, but by the next highest in the productive organization in authority. Foremen's meetings are called by the general foreman. A foreman's safety committee is appointed, not for the purpose of assisting the safety engineer in his work, but for the purpose of assisting the whole body of foremen, since it is not practicable to detach the whole body for the purposes of joint inspection. The committees' findings are reported at the meetings and discussed by the foremen. It is recognized that it was the individual foreman's duty to discover and remedy such conditions prior to the visit of the committee, and not primarily the duty of the committee. The committee follows up. If the committee cannot find a remedy to recommend, the safety engineer is directed to investigate and report in writing.

It is by such means as this that accident prevention supervision can be introduced into an industrial plant as an integral part of the work, and the conflict that otherwise arises between production and safety is largely avoided.

RESULTS IN ONE PLANT

If you will allow me, I wish to digress a moment to show you the results of what I think is one if the most interesting analyses of conditions in industrial plants. The plant in question was built for war purposes at the time war was declared on Germany by the European powers, and was designed for a duration of about 1½ or 2 years. It was actually in operation for 4 years, and toward the end of 1918, and possibly toward 1917, not only was engineering revision at a standstill, but I believe on the downward course. In other words, the plant was deteriorating very rapidly. The temporary guards that had been put up were falling apart, and had not always been replaced since the end of the war was uncertain and there was a great

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difficulty in getting men for the necessary repair work.

In other words, perhaps during 1917, and certainly during 1918, there was no improvement in engineering revision in the aggregate and the plant structurally went downhill. This, however, was accompanied by a corresponding improvement in supervision. The plant manager, from the start, had been keenly interested in accident prevention and had stood behind it, but his attitude had not firmly impressed itself on the good employes. There was a fine safety engineer and there had been excellent safety educational work of the informative and inspirational sort without stint, but real thorough supervision for safety did not make itself felt until 1918.

FREQUENCY AND SEVERITY RATES

I wish to tell you of the effect of this work on the frequency and severity rates, calculated for 6 month periods, but on the annual basis:

Period	Frequency Rate	Severity Rate
1917—First half	176	10.5
Second "	134	11.7
1918—First "	108	9.9
Second "	70	7.0

Ninety-five per cent. of the frequency rate was due to temporary disability accidents, and it is therefore not significant.

We found that 90 per cent. of the severity rate was due to deaths and permanent disability accidents, so we analyzed these combined fatality and permanent disability accidents on the basis of responsibility, dividing them according to the classifications of negligence, lack of supervision, defective equipment, and "other," defective equipment being practically "engineering revision."

I shall quote the frequency rates only for accidents due to lack of supervision. These for the four 6-month periods were: 1.32, 1.90, .81, and .94, while the severity rates for the same class of accidents based on responsibility were: 2.73, 3.54, .40, and .67.

I could give you the rates for the other classifications of responsibility if it was worth while, but it is not worth while because their variations make them worthless. There is not another classification of responsibility that shows a logical decline in frequency and severity.

I think that this is the meat out of the cocoanut—that on this plant where we had a downhill engineering revision situation, we were having a decrease in frequency and severity of serious accidents which were due to lack of proper supervision.

Twelve Months' Progress in Safety Work

By David Van Schaack

Retiring President, National Safety Council

Proceedings of the Eighth Annual Safety Congress

ALTHOUGH we wish that more could have been accomplished, we can look back upon a year of real progress, and in many respects, our direct service has been notably improved. General bulletins have been of better quality and wider range, large-size ones have been issued more frequently, sectional bulletins show improvement in both nature and appearance, and a useful catalog of bulletins has been prepared. A Safe Practices pamphlet has been issued every month, as against 8 in all the previous year, and 2 sectional pamphlets have been published. The supply of films, slides and phonographic records has been enlarged and a catalog of slides has been issued. Our information bureau and library have increased largely in quantity and value of material, especially on industrial relations, and extensive progress has been made in proper cataloging.

In making use of its industrial relations material, the Council has followed,

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and very properly, a conservative policy. It has not attempted to give expert advice, but it has endeavored to bring together all that is really known upon this subject and to place it at the disposal of its members. This latter object has been accomplished in two ways; hundreds of inquiries have been answered by sending the inquirer printed matter relating to his question, as, for instance, on various employes' representation plans now in effect, and the council has issued 16 executive series bulletins, designed principally to stimulate the interest of its members in industrial relations subjects.

All of this improvement in direct service has been made possible largely by the continuance of that cordial co-operative effort on the part of the entire membership which has always been a distinguishing characteristic of the council, and the value of which I wish to emphasize once more, and more strongly than ever. I think it no exaggeration to say that there has never been a finer illustration of close and hearty co-operation than that given by the membership of the National Safety Council from its organization to the present day.

RAPID DEVELOPMENT OF WORK

In three essential directions other than the service already mentioned the council's work has developed rapidly and most satisfactorily during the year—in the extension of permanent local council organization, in the promotion of public safety, and in the advancement of safety education. Just as the Chicago headquarters are the heart of organized safety effort, so the local councils are the arteries and veins which carry life-giving blood throughout the body of the National safety movement. They bring the council into direct and intimate touch with its membership, permeate communities with a real safety atmosphere, and spread far and wide the gospel of care for humanity. A year ago we noted with appreciative interest the earnest of success for the local council permanent secretary plan given by the progress of the experiments being conducted at Pittsburgh and St. Louis. Today we can feel, with more than reasonable assurance, that the promise afforded by these experiments has been fulfilled, that the permanent secretary idea is thoroughly practical and of far-reaching value.

SCHOOLS FOR SAFETY SUPERVISORS

One of the most striking features of local council work has been the schools for safety supervisors, four of which have been conducted during the year, at St. Louis, Pittsburgh, Rochester and Cleveland. In these schools a course of 15 lessons has been given and 464 men have been graduated. Not only have these schools been of much direct benefit to those attending them, but they have had a notable influence upon other branches of the council's work. A most gratifying development, for instance, has been the co-operation of the students in stimulating attendance at foremen's meetings. Taking St. Louis for an illustration, the average attendance for such a meeting in 1918 was about 150. After the opening of the safety supervisors' school, the attendance at foremen's meetings ranged from 1,200 to 2,000. It is believed that the graduates of these schools will also be of much assistance in securing large attendance at the similar schools for foremen which are one of the council's new plans for the coming year.

Closely connected with the development of the permanent secretary plan for local councils, in fact dependent upon it so far, has been the expansion of the council's public safety work, which promises to become a real factor in many communities. The experiment conducted at Rochester early in 1918, now a permanent enterprise, pointed the way to work along generally similar lines in St. Louis which, ever since its memorable Safety Week at the time of the 1918 congress, has conducted an active public safety campaign, and has led to the recent inauguration of such a campaign in Pittsburgh. The impulse given by the present Safety Week here will doubtless result in Cleveland likewise undertaking to establish systematic public safety work.

"BASED UPON RIGHT PRINCIPLES"

The council's public safety plan is based upon right principles. While the

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local council undertakes to stimulate public safety interest in a community, and while its permanent secretary takes an active part in the resultant campaign, the fundamental basis of the plan is to bring together in a comprehensive safety organization representatives of those departments of the municipal government which would properly be concerned, and representatives of the leading organizations naturally interested in the welfare of their city and its people, and to give this organization the benefit of definite knowledge of what has been done elsewhere and how it has worked out. Your council is thus attempting, and I believe successfully, to fill a need which has hitherto remained unsatisfied, and I say this with all due deference to previous public safety efforts. It encourages a genuine and wide appreciation of, and demand for, public safety, aids in the creation of an organization which will be fully representative of the community, and then lays before this organization a carefully thought-out plan of action based upon all the experience available.

This method is exactly in line with that so successfully followed in industrial safety work and is in full keeping with the council's general policy. There is no attempt by an outside agency to impose its individual theory or to arrogate to itself the practical application of such a theory. Co-operation by all interested, and by all who should be interested marks the council's public safety work just as distinctively as it does its industrial safety efforts. In each field representative committees decide upon the plan and carry out its details, and there is the same endeavor in both to arouse that deep and general interest which can come only from every one feeling that he has his own particular bit of work to do, and that the success of the plan as a whole depends upon his doing it.

SAFETY EDUCATION

In many respects the greatest advance made by the council during the year has been in the matter of safety education, though not so much in the way of what has actually been done as in that of building a solid foundation for future accomplishment. No branch of the council's progress is, in my opinon, more deserving of our keen interest. Promoting safety education in the schools and colleges is reaching to the fundamentals of the safety problem and is in the natural line of development of the council's work. What has been our chief task during our 6 years of active existence? Has it not been education? Admitting the great value of the council as a bureau of exchange, as a collator and distributor of the best experience in safeguarding and in safety organization, has not the council's chief mission been to carry the message to Garcia, to educate both employer and employe?

We have been trying, and with ever-increasing success, to educate the employer to a sense of appreciation of the need for accident prevention on both humanitarian and economic grounds, and of the value of the safeguards and organized methods which experience has shown to be the most effective. We have been endeavoring, and I believe with equal success, to educate the workman to an understanding of what accidents mean to him and to his, and of the fact that if they are to be reduced to the minimum, he must personally co-operate in the work of prevention. We have had to do this because unfortunately safety has so far been largely an afterthought, because it has been in no sense a factor in the ordinary education of either employer or workman, and because, in the absence of a natural tendency to think for safety, we could only try to get them to think against danger.

We soon came to appreciate that, necessary as this education was and for a long time will be, it was at best but a stop-gap, and that the safety movement must go deeper. Our experience was the same in this respect as it had been in the matter of safeguarding. While our first effort naturally was to see that existing buildings, machinery, and other physical equipment lacking elements of safety were safeguarded as well as possible, it quickly became apparent that the ultimate solution of this problem would be to make them right from the start, designed, constructed, and installed with due regard for every safety consideration. It is the same with safety edu-

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cation, and I am happy to report that the council has made real progress during the year in reaching to the fundamentals of this problem.

ST. LOUIS PLAN

The most distinguishing feature of our safety educational effort, however, has been the working out in St. Louis, by Dr. E. George Payne and his associates, of a definite plan for safety education in the common schools of the country, and the publication, at the request and with the endorsement of the council, of a book describing and illustrating this plan, which has been brought to the attention of the National Education Association and which it is to be hoped will soon have wide circulation. In this plan the problem has been approached with full appreciation that it is psychological, that the object is to get people to think in terms of safety, and that if this object is to be attained, if regard for safety is to have a controlling influence upon the lives of men and women, it must be developed in their minds while they are children, throughout the formative period of their school education, so that it will permanently affect their way of thinking.

A NEW THOUGHT

Safety has been handicapped by being misunderstood. It has been too commonly looked upon as merely a system of inhibitions, and, as we all know, a negative appeal stirs only with difficulty and incompletely either the heart or the imagination. This misunderstanding is due to the fact that safety is a bilateral idea. It has its positive as well as its negative side, but, like most people with two faces, it presents only one to the public. We are thoroughly familiar with the face "Safety from," but we have not seen clearly enough the face "Safety for." We have been too apt to ignore the fact that safety puts something in as well as takes something away, that it is not a process of deprivation but a process of substitution.

I can think of no better, no larger, illustration of this than that furnished by the great war. In the first flush of the French soldier's hot resentment against the invader, he threw himself into the fray with the utmost recklessness. His fine patriotism gloried in the sacrifice of his life. As the months and the years passed, he increasingly made use of every means of protecting that life. He had come to see that the safety of his country demanded all possible safety for himself and that he might the longer and the more effectively stand between her and the barbarians who were trying to destroy her. He sought safety, not from the enemy, but for France.

Safety gets its true meaning from the fact that life has a value. The positive side of safety lies in the thought that nothing must be allowed to interfere with full realization of this value. The St. Louis plan for safety education is based upon recognition of the need for furthering this positive side of safety. It seeks to avoid letting safety appear as a deprivation, as robbing life of the characteristic of adventure; on the contrary, viewing life itself as the great adventure, its object is to substitute a worthy adventure for a mean one. This is a new thought in the conception of the safety movement, and I hope and believe it will go far. It lifts the safety movement from the material sphere to a spiritual one. It makes the fight for safety a fight for a real, a worth-while adventure, a fight which shall make life the measure of a purpose, and not the marred result of purposeless chance.

ENDURING EFFECT

Little did any one foresee when the council was started a few years ago by a small group of men who sought help from each other in the details of what is now but a part of our work, that from such simple and restricted beginnings there would develop a society, the several but homogeneous activities of which would influence our National life in so many ways and would have an enduring effect upon the true welfare of mankind. This development has been normally gradual, as well as astonishingly rapid, for it has come from the attempt to fill one need opening up the existence of another. Serving those already interested in safety, has pointed out the way to interesting others. As industry is but

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a part of community and National life and its interests are inseparably interwoven with both, the forwarding of industrial safety has been followed closely by efforts along public safety and safety educational lines.

We have unavoidably been led into fields other than our own immediate one, but we have entered them only in a cooperative way, or, as in the case of preventive and curative medicine, to enable a closer and wider application to industry than would otherwise be possible, to intensify in one specific direction the work of another National organization.

Inasmuch as it is you members of the National Safety Council who really have done all that has been done, and who have built up an organization of such possibilities, there can be no tinge of self-gratulation to my inquiry as to whether you do not derive a keen satisfaction from what you have already accomplished, and do not feel an increasing enthusiasm to grasp the opportunities which lie before you.

PROMOTING NATIONAL EFFICIENCY

In what more useful, what nobler effort, could you engage? In what way, or ways, could any one, or all, of you take part in a movement of more lasting benefit to humanity? Through your council you are promoting better conditions under which men and women in industry may work, and better working conditions inevitably lead to better living conditions.

By bringing the employer and the employe together, man to man, you are furthering a better feeling between those who too often, unfortunately, have considered themselves as belonging to different classes, and are doing much to forward that new industrial day, the first rays of whose morning sun we hope we see creeping above the horizon. By saving thousands of men and women each year from accidental death and maiming, you are conserving the greatest resource of any Nation, you are promoting our National efficiency, you are reducing the suffering, grief, and privation of which at best the world must have too much, and you are preserving to many of the rising generation the educational opportunity which will give them their chance in life.

Street Safety in Detroit

A NEW invention to protect Detroit pedestrians, which has been placed in position at one of the city's busiest street intersections, consists of four posts, one on each of the corners at the crossing, each surmounted by a gong and a hollow cube, through the slot of which appear the legends, "stop" and "go." The interior of the cube will be lighted by electricity at night.

The crossing policeman, at his usual station in the center, presses a button a second or two before he blows his whistle for the change of traffic direction. This button, connected by wires to the corner signal posts, rings the gong changing the sign in the cube, thus giving foot traffic the warning before street traffic is released. Under the usual system, people are still streaming across the street when the vehicles begin to move. This, it is claimed, is at the foot of many of the traffic accidents.

Birmingham Roofs Dangerous

IN 1914 Birmingham, Ala., passed an ordinance requiring incombustible roof coverings throughout the city, but the ordinance was repealed in 1916, and such roofs are not now prohibited there except within the fire limits. Some time in the future, after an expensive lesson, Birmingham may again set its official face against inflammable roofs.

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The Mine Disaster at Baltimore Tunnel

ON June 5, 1919, an explosion occurred in the Baltimore Mine tunnel near Wilkes-Barre, Pa., owned by the Delaware & Hudson Coal Company, by which 92 men lost their lives. A commission was appointed promptly to investigate the cause of the disaster and submit a report to Seward Button, chief of the Pennsylvania Department of Mines.

The commission consisted of the following named State mining inspectors: Joseph J. Walsh, Thomas G. Williams, E. C. Curtis, Robert Johnson, John B. Corgan, and D. T. Davis.

Majority and minority reports were filed on July 9; the minority report was submitted by Mr. Walsh, the majority report bore the signatures of all other members of the commission. These reports were not made public until a few weeks ago.

MAJORITY REPORT

The majority report, inconclusive regarding the cause of the disaster, said:

As to the possibility of the accident being caused by electricity, we are agreed that it could have happened by the wire falling on the rail and causing a short circuit, and if the powder kegs in the car were placed in such a position as to form the right contact with the pedestal bolts, it is possible that it could have happened in this manner. Or, as the men were reported to have been told to get out of the trip and walk in, it may be that as the cars were overcrowded, some one picked up a keg of powder and attempting to get out of the car may have touched the wire and caused a short circuit, and in that way ignited the powder. But by close application to detail and the mass of testimony submitted as evidence, we fail to find any positive or direct evidence that would support either of these theories, and we can not state conclusively that this was the cause of the disaster.

As to other possible causes of the ignition, it has been proved by testimony that lights were lit in the trip, but not conclusively proved that lights were lit in the car where the accident occurred. We saw mute evidence, however, of the fact that it was customary for men to smoke in the trip as they were bound for their working places.

Two pipes and several lamps were found in the car where the ignition too place, as well as various other articles that men carry in their pockets. The fact that these pipes and lamps were found in the car where the accident occurred is not sufficient evidence in our minds to prove that the accident can be attributed to men smoking or to lights being lit in the car. While these can be stated as possible causes, we fail to find any convincing evidence that men were smoking, or that lights came into direct contact with the powder, although it is customary for men to smoke while going into their work and smoking in this mine was not prohibited.

As the testimony shows that some lights were lit on the trip, possibly thirty, and that some of these lights were lit in close proximity to the scene of the accident, and as we know that it is usually the custom for men entering the mines to light their lamps just as they are starting in to their work, it is possible that the accident could have been caused by a lamp or carelessly thrown match coming into contact with the powder in a defective keg. We have no positive evidence to support this theory as to lights or as to defective kegs in this car, but it has been clearly shown that at least one of the kegs that was removed intact from the thirteenth or last car after the explosion was defective, and if such a keg was in the tenth car and the spark from a lamp or pipe, or an electric spark came into contact with such a keg, it would without the shadow of a doubt cause the accident to occur.

However, as we fail to find any direct or positive evidence to substantiate either theory, and as the mass of evidence given is contradictory on the most important details, and fully realizing the fact that the accident happened so quickly that it was almost impossible to record even by the eyewitnesses just what took place, we find it impossible to specifically state the cause of the ignition of the powder.

We do, however, deplore the fact that men and powder were in the same car on the trip; that lights were lit at or near the scene of the accident; that possibly pipe smoking was indulged in in close proximity to the powder and that powder was conveyed in an open ordinary mine car without any protection from possible accident from electricity; and that also on this morning there was not an inspection of the trip made by the officials or the men, as it seems that if ordinary care or judgment had been exercised, this awful disaster could have been avoided.

MINORITY REPORT

Mr. Walsh declared that the explosion was caused by electricity, that excessive amperage on the trolley wire in the mine on the morning of the explosion caused the wire to sag and come in contact with the trip of cars on which a quantity of powder and the men were

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Photo by J. T. Jennings, Wilkes-Barre

One of the cars in which some of the men rode while entering the Baltimore tunnel on June 5. The car also carried about 150 pounds of powder. Miners' dinner pails and empty powder tins were all that was left in the car after the disaster—ample evidence of the folly of carrying both men and powder in the same car

being transported into the mine. The testimony given by Daniel Boyle was corroborated by nine other witnesses:

Testimony of Daniel Boyle:

Immediately before the trip stopped, I heard some voices calling: "Look out for the wire!" That was the first intimation I had of the wire being down. Then the trip stopped, and there were some men coming off the night shift and one of them placed his hand on one of the cars and he said: "No more of that for me," like as if he had gotten a shock of electricity. Then there was a man sitting close to me, and he said: "Them wires hot." I looked in the direction in which he indicated, which was about eight or ten feet in front of where I was sitting, and I saw drops falling on the wire, and every time they fell they evaporated, showing that the wire had been in contact with the car or some other object, which made it so hot. At that juncture I came to the conclusion that seeing that the wire was getting so hot and the circuit breaker still holding, that something was going to happen and I looked around to get out of the car. At that instant I saw a blue flame coming along either the trolley wire or the top of the cars—I could not tell which—and as I saw that, I stooped down to avoid the flame. Then there came a series of flashes—well, not exactly flashes—but whole seas of fire came along, and I lay down for a short time—I could not exactly state the length of time—and a short time after that I made an attempt to rise up, and as I did, I struck my head against the roof thus forming a ground, and I went down in a heap with electric shock. I lay there for some little time and there were dead men on top of me at this time. After a little while I made another attempt to rise, and put up my left hand on the edge of the car, raised myself up and dropped the dead men off me. I drew my head above the car and then came the last flash of fire. It was then I got my face burned.

Conclusion of the minority report:

Some witnesses saw the trolley wire touch the car while others saw electric flashes or received an electric shock, while on the trip at the time of the accident.

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On June 7 an effort was made by the commission, appointed for the purpose of investigating the accident, together with the mine officials and others to reproduce the condition that existed in the morning of the accident for the purpose of learning whether or not the powder could be ignited as a result of a short circuit.

The trolley wire was broken at the "Back Slope Branch" and the wire was so placed on the track that each end formed two contacts with the rail. Thirteen cars were then placed in the tunnel and a keg of powder placed on the wooden floor of the tenth car, the current was then turned on for ten seconds, the powder was not ignited, neither did we observe electric flashes.

The second test was somewhat more favorable for ignition. In this trial contact was made by placing several empty powder kegs in such position that they touched four pedestal bolts in the bottom of the car, two on each side. A keg containing powder was then placed upon the empty kegs referred to and while in this position, with the trolley wire lying on the rail as herebefore described, the current was again turned on and permitted to remain for ten seconds.

During this trial a noise such as produced by electric flashes was distinctly heard by those near the tunnel entrance, and in a short time smoke was observed coming out of the tunnel.

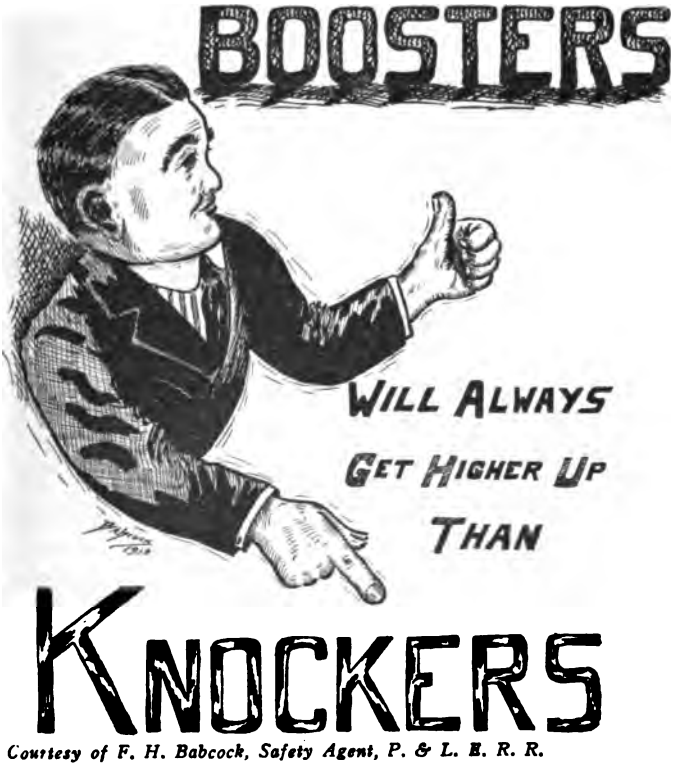
There was also some evidence of heat, since one of the pedestal bolts on which an empty powder keg rested was wet before the powder was turned on and was perfectly dry after the test. The powder, however, did not ignite.

Because of the failure to ignite the powder as described it is not fully convincing that this was not the cause of ignition, inasmuch as 1600 amperes passed through the line, on the morning of the accident, while during the tests, for some unknown reason, only 750 amperes could be obtained.

After a careful review of the testimony herewith cited it appears that the cutting out of the circuit breaker on the morning of the accident bears a direct relation to the ignition of the powder. And a safe inference can be found to the effect that the powder was ignited in some unknown manner by the electricity.

Many prominent mining men are said to place faith in Mr. Walsh's theory.

Safety Psychology



Courtesy of F. H. Babcock, Safety Agent, P. & L. E. R. R.

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Oil Fire at Greenpoint, L. I.

IT is not known what caused the first tank to ignite at the Standard Oil Company's refinery at Greenpoint, Long Island, on September 13. It was a steel tank with steel roof, as are all the tanks of the company. Gases created by the fire caused the tank to expand and partially assume the shape of a sphere, forcing down the bottom until the sides of the tank were raised from the ground. The roof then blew off, and the tank fell, breaking all the pipe connections, and allowing all the contents to pour through an 8 inch connection at the bottom. Simultaneously the adjoining tanks caught fire.

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Standard Oil Fire, Greenpoint, L. I., Sept. 13

The oil escaping from the first tank flowed down through the refinery, under the agitators and into the pipe trenches.

The foam system was put in operation at once to protect the tanks, but with the amount of chemical solutions available at the time, it was thought best not to attempt to extinguish the burning oil on the ground, but to concentrate on the tanks.

Every tank into which the foam was introduced was saved intact, although exposed to the full heat of the burning oil with which the tanks were surrounded for hours. This saved 12 tanks, all of which were on fire, in the midst of the burning area, including the tanks next to the one first on fire. In these instances the tanks, their contents, and even their roofs were uninjured.

In extinguishing the fires in these tanks it was necessary to force the "Fire-foam" solution through lines which had leaders into the affected area, which were broken by the fire. The supply of foam solution was exhausted in extinguishing these fires and in taking care of this leakage. An endeavor was made to mix a fresh supply, but is was impossible to dissolve the chemicals properly in so short a time. This was discovered upon attempting to pump the newly prepared solutions into the burning tanks.

Foam was not formed, and the introduction of the chemicals had the invariable effect produced by introducing any foreign substance into a hot tank of burning oil, namely that of causing the contents to flash up into the air. This action has been commented on as indicating that the foam was ineffective and actually added to the fire. In view of the facts that theory is incorrect, as foam was not produced by the second lots of solutions.

That this is true was proved by subsequent events, for later the solutions were properly mixed, and on Wednesday, September 17, tanks 11 and 13, 40-feet and 50-feet in diameter respectively, were put out in 20 minutes, although they had been burning four days and were extremely hot. Upon introducing the foam these tanks flared up to a great height, but the flames soon died down as the foam covered the surface until the last vestige disappeared.

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Pittsburgh Experiment Station

MINE safety played an important and at times a spectacular part in the events connected with the dedication of the million-dollar Pittsburgh Experiment Station of the Bureau of Mines, at Pittsburgh on September 29-30 and October 1. Mining engineers, mine superintendents, safety inspectors and miners from all parts of the country gathered during the three days to witness the First Aid and Mine Rescue contests, to inspect the buildings and attend the dedication exercises. Those interested in accident prevention in the mining industry found something of interest in every part of the program.

On September 29 the beautiful buildings were thrown open to visitors. Of especial interest was the exhibit of mine safety appliances in the Museum Hall, which included various types of oxygen-breathing apparatus, safety lamps and first aid supplies. The gas mask laboratory attracted many visitors with its facilities for testing gas masks and for developing apparatus for various gases.

Amid impressive ceremonies the Experiment Station was formally opened. The dedicatory exercises were held in the rear of the main building. Alexander T. Vogelsang, first assistant secretary of the Department of the Interior, presented the key of the building to Dr. Van H. Manning, director of the Bureau of Mines.

BITTNER DESCRIBES BUREAU'S WORK

In a stirring address Van A. Bittner, representing the United Mine Workers of America, described the work of the Bureau of Mines in safeguarding human life. He said in part:

"I may say that these buildings stand as a monument to the wonderful work of the first director of the Bureau of Mines, our friend, the late Dr. Joseph A. Holmes. It is because of the things this building stands for, and the things that our National Government hopes for, that makes this occasion more wonderful probably than under any other circumstances.

"The Bureau of Mines was established by Congress for the express purpose of conserving life and the natural resources of our country. With that mission the Bureau of Mines has gone forward, and, even with a lack of funds to carry on properly its work and the lack of a building, it has made wonderful strides in the direction of saving life and the resources of our Nation.

"I speak for the coal miners' organization today. I am more closely in touch with the men of the coal mines than I am with those engaged in metal mining in this country. And I know from past experience that prior to 1910, when the Bureau of Mines was established by our National Government, the loss of life and the loss of natural resources in the coal mines of this country were appalling. In no country—no mining country—in the world was loss of life greater or loss of natural resources greater than in America prior to the establishment of the Bureau of Mines. This may seem strange, but careful investigation of the facts will prove that the statement is correct. The coal miners of America—when I say coal miners I mean those connected with the coal mining industry, both the operator and the man who works for him—are ever willing, if they know the proper methods, to do the things which will better safeguard the lives of the men who work in the mines and also safeguard the resources of our Nation.

"What greater mission in the industrial life of our Nation can the Government or the men have than safeguarding the lives of those who work and the preservation of our natural resources for the generations to come?

"The Bureau of Mines was established in 1910. Its record of saving of life has been truly remarkable. From a small beginning it has grown until today there are 11 experiment stations in various parts of our country situated in the great mining centers. There are 10 mine rescue cars used for the purpose of traveling over the highways and by-ways, and they are instructing the men who work in the mines and those interested in the mining industry in mine rescue work. We have 8 mine rescue stations, and we have the experimental mine situated in the Pittsburgh district at Bruceton.

"In 1909, the year previous to the establishment of the Bureau of Mines, there were killed in the coal mines of the United States 3.96 per thousand men employed. The production per death was 174,416 short tons. In 1918 the death rate was 3.39 per thousand men employed. The production per death was 266,000 tons, or a gain of production per death in 10 years of 91,584 tons of coal. This is indeed a more than gratifying result."

REMARKS BY GOVERNOR SPROUL

Discussing adequate housing of miners, William C. Sproul, governor of Pennsylvania, said:

"Mining, and especially coal mining, is not

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a parlor occupation. It is not a thing which can be done in the utmost comfort always, and for that very reason it is wise to take proper care that every development in the way of teaching and application of safety and every development in the way of mechanical assistance in the arduous labor of mining should be developed. That is one of the things that employers with farsightedness can help a great deal. And I am glad to understand that employers in certain lines have seen this and have come forward not only with co-operation to their plants, but very substantial assistance in other directions to help the work which is being planned by the Federal Government. There ought to be more of it.

"There is one other thing in which I am very much interested, and that is the surroundings of our mining properties in Pennsylvania. I am interested very much, and the State is going to be interested very much, in this question of housing. You can have your mines as safe as you please, as safe as human ingenuity is possible to make them; you can have engineers as farsighted as you please, and your miners as loyal and progressive as you please, but you cannot raise good citizens in squalid, badly cared for localities and in bad, poorly constructed, unsanitary homes. It is not possibly part of the duty of this institution to bring about better conditions of this kind, although I know they are very much interested in that proposition and very much interested in the state of things which will bring about better conditions, but I think it is the duty of the State to help in those matters very materially.

"If I am spared until the next session of the Legislature, I propose to make certain recommendations to the people of this Commonwealth and representatives by their lawmakers which may be considered radical, but which I believe will be very effective in bringing about better conditions, better home conditions, and better looking, more comfortable, more sanitary and more inviting communities for our people to live in. The State can do a great deal in that direction. The State can compel some things to be done in that direction. The State, by co-operation with fair-minded citizens, can bring about conditions which will make the surroundings of our mining industries what they should be."

OTHER SPEAKERS

Others who spoke included Chancellor McCormick of the University of Pittsburgh, Mayor Babcock of Pittsburgh, First Assistant of the Secretary of the Interior Alexander T. Vogelsang, F. A. Holbrook, superintendent of the Pittsburgh Station, and Chairman Gillespie.

PRESIDENT WILSON'S MESSAGE

The following message from President Wilson, written previously to his illness and addressed to Secretary of the Interior Lane, was read:

"Will you not be kind enough to convey my most hearty greetings to the assemblage at Pittsburgh next Monday? I wish that I might be present to express my very deep interest in the work being done by such instrumentalities for the increase of production, the safeguarding of life and the raising of the standard of labor and scientific endeavor. It is a very happy circumstance that with this meeting should be associated the ceremonies connected with the dedication of the new buildings in Pittsburgh of the Bureau of Mines."

EVENTS AT EXPERIMENTAL MINES

On Monday afternoon the guests boarded a special train for Bruceton, Pa., to witness the demonstrations at the Government Experimental Mine and Explosives Testing Station. The destructive possibilities of coal dust were vividly shown in the explosion staged in the Experimental Mine, where coal dust had been placed and set off by a cannon. The smoke and flame that poured out of the entrance of the mine was enough to daunt even the bravest doughboys. Following the explosion a demonstration was made of the use of rock dust as a barrier against explosions. Other demonstrations included the use of liquid oxygen explosives, the effect of an electric current making a circuit through a metal powder-container and the explosive possibilities of the flame of a miner's lamp coming in contact with kegs containing black blasting powder.

MINE RESCUE CONTEST

On the following day the Mine Rescue contest was opened at Forbes Field. Twenty teams took part in the elimination tests, which were held in a wooden structure in the form of a mine gallery, which had been erected on the field. Contesting teams entered the gallery fully equipped with the necessary respiratory and first aid apparatus, and proceeded to work out the "problems" submitted by the committee. One of these was as follows:

A miner has been found unconscious. The canary carried to detect the presence of dangerous gases has been overcome en route. Remove the miner to the outside and restore by artificial respiration.

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FIRST AID CONTESTS

In the afternoon were held the elimination First Aid contests. The 81 teams, from 15 States, made a pretty picture in their white uniforms, with their blankets and first aid equipment spread on the green. First aid problems of a practical nature were worked out, a man from each team acting as the patient. A large number of physicians were on hand to decide on the relative merits of the contestants.

The afternoon closed with a demonstration of a coal dust explosion.

THIRD DAY'S EVENTS

A feature of the day's exercises was the announcement, by Director Van H. Manning, of the Joseph A. Holmes Safety Association awards. The association was founded in 1916 to give recognition to those who have performed heroic deeds in the saving of life in the mining and metallurgical industries.

The final Mine Rescue and First Aid contests were decided during the morning and afternoon. A large number of ties had to be worked off before the winners could be decided.

For the entertainment of the guests the entertainment and program committee arranged an organ recital and moving picture, "The Story of Coal," on Monday evening; a pageant glorifying the mining industry on Tuesday, and a smoker in the Chamber of Commerce on Wednesday evening.

WINNERS OF THE CONTESTS

National Mine Rescue contest:

Union Coal & Coke Company, Acme No. 2 Mine, Bentleyville, Pa., percentage 99.

Leisenring No. 1 Rescue Station, H. C. Frick Company, Pittsburgh, Pa., percentage 98.

Buffington Rescue Station, H. C. Frick Company, Pittsburgh, Pa., percentage 96.

Orient Central Rescue Station No. 1, Orient, Pa., percentage 91.

Hillman Coal & Coke Company, Brownsville, Pa., percentage 91.

Carnegie Coal Company, Pittsburgh, Pa., McDonald Mine, percentage 90.

Pittsburgh Terminal R. R. & Coal Company, Pittsburgh, Pa., Mines Nos. 2, 3, 4 and 6, percentage 89.

Inland Collieries Company, Harmarville, Pa., Indianola Mine, percentage 82.

Madison Coal & Coke Corporation, Carterville, Ill., percentage 81.

Washington Coal & Coke Company, Star Junction, Pa., percentage 80.

The National First Aid contest:

Standard Mine, H. C. Frick Company, Mt. Pleasant, Pa., percentage 99 6/10.

Butte District, Montana, percentage 99.2.

Roslyn Fuel Company, Seattle, Wash., percentage 98.2.

Colorado Fuel & Iron Company, Berwind Mine, Pueblo, Col., percentage 98.2.

Pennsylvania Coal & Coke Company, Cresson, Pa., percentage 98.2.

Rembrandt Peal Interests, Team No. 2, St. Benedict, Pa., percentage 98.

Pittsburgh Terminal Railroad & Coal Company, Mine No. 6, Bruceton, Pa., percentage 98.

Bertha Coal Company, Rachel Mine, Broomfield, W. Va., percentage 97.8.

Ronco Mine, H. C. Frick Company, Pittsburgh, Pa., percentage 97.8.

Davis Coal & Coke Company, Kempton, W. Va., percentage 97.8.

Penn Mary Coal Company, Heilwood, Pa., percentage 97.2.

Madison Coal Corporation, Carterville, Ill., percentage 97.2.

United States Coal and Coke Company, Gary, W. Va., percentage 96.6.

Consolidation Coal Company, Jenkins, Ky., percentage 96.4.

Sonman Shaft Coal Company, Portage, Pa., percentage 95.8.

Vesta Coal Company, Vesta No. 7 Mine, W. Brownsville, Pa., percentage 95.2.

Primos Chemical Company, Vanadium, Col., percentage 94.8.

Superior Coal Company, Gillespie, Ill., percentage 94.8.

J. K. Dering Coal Co., Clinton, Ind., percentage 94.8.

United States Fuel Company, Universal, Ind., percentage 92.4.

Joseph A. Holmes Safety Association awards:

L. M. Jones, mining engineer of the Bureau of Mines, led a rescue crew into the Barrackville No. 7 Mine, Barrackville, W. Va., in an endeavor to rescue miners entombed by an explosion and in the effort lost his life October 20, 1916. A gold medal and diploma were awarded him and given to his widow.

Granite J. Frowen and Thomas Cooney traveled through the burning Pennsylvania mine of the Anaconda Copper Co., Butte, Mont., and led 15 imprisoned miners to safety. Gold medals and diplomas were awarded to each. At the same fire, William G. Mitchell and Neil Brennan lost their lives in a similar attempt to rescue their comrades, and gold medals and diplomas were awarded to each.

Twenty-seven men were saved from death at the fire in the Speculator Shaft, Butte, Mont., June 8, 1917, by the heroic action of Manus Duggan, who collected the men and showed them how to build a barricade that protected them from the deadly gases. He later became separated from the others

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and lost his life. To him a gold medal and diploma were awarded, being given to his widow.

A rescue crew attempted to enter the Havaco Mine, Havaco, W. Va., following an explosion on Decembes 21, 1918, to rescue any men who might be still alive. In this attempt John Farmer, the mine foreman, lost his life, and C. W. Keith, the surface foreman, was overcome, but was rescued by Clay Turner and Adam Mitch. Samuel Jones attempted to rescue Farmer, but died in the attempt. To each of these men gold medals and diplomas were awarded.

Six miners were imprisoned by a mine fire at the Mt. Braddock Mine, Mt. Braddock, Pa., January 20, 1919. Samuel Hardy and Clyde Foltz went to their assistance, but lost their lives in the attempt. Michael Sopchick, Frank Krum and August Klause entered the mine, and after traveling almost a mile on foot they rescued two miners. To each of these men gold medals and diplomas were awarded.

DONORS OF PRIZES

The following donated the prizes awarded to the successful teams in the National Mine Rescue and First Aid contests:

National Safety Council, Chicago; Coal Industry, Pittsburgh; Life Saving Devices Company, Chicago; Mine Safety Appliances Company, Pittsburgh; Atlas Car & Manufacturing Company, Cleveland; Edison Storage Battery Company, Orange, N. J.; Goodman Manufacturing Company, Chicago; United Engineering & Foundry Company, Pittsburgh; Western Electric Company, Pittsburgh; Iron City Electric Company, Pittsburgh; Pittsburgh Dry Goods Company, Pittsburgh; Bair & Lane Casualty Insurance Company, Pittsburgh; Wolf Safety Lamp Company, New York; National Carbon Company, Cleveland; Safety First Supply Company, Pittsburgh; Justrite Manufacturing Company, Chicago; Electric Storage Battery Company, Pittsburgh; Bauer & Black, Chicago; Dewar Manufacturing Company, New York; Johnson & Johnson, New Brunswick, N. J.; Doubleday Hill Electric Company, Pittsburgh; H. J. Heinz Company, Pittsburgh; Hercules Powder Company, Wilmington, Del.; B. K. Elliott Company, Pittsburgh; Heeren Brothers, Pittsburgh.

The Americanization Movement

"Thorough and Expedient Unhooking of the Hyphen"

Proceedings of the Eighth Annual Safety Congress

[A summary of three papers: "Principles and Methods of the Americanization Movement," by Allen T. Burns, Director, Study of Methods of Americanization, New York City; "The Immigrant's Part," by Hans Rieg, Chief, Foreign Language Division, United States Treasury Department; "What the Industries Can Do," by H. T. Waller, Akron, Ohio.]

ALLEN T. BURNS: Americanization is the joining of the native and foreign born "to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty"; in short, to take part democratically in promoting the common weal of Americans.

Americanization includes:

1. Understanding what groupings of persons do and may control the various fields of activity in America: e. g., the group consisting of the Nation as a whole directs such matters as: naturalization, interstate transportation, and war; the State controls health and education; the city regulates conditions of streets and local trade; the industrial group determines most working conditions; the neighborhood prescribes manners and dress.

2. Acquiring the means of group action such as a common language and identification with, and incorporation in, various groups, e. g., forming neighborhood ties, joining a political party, allegiance to the Nation.

3. A mutual understanding by the native and foreign-born of each others' habits of life and thought, the necessary basis for co-operation of any diverse elements.

4. Modification of the scope, purpose and nature of the activities of the various groups and the make-up of the groups themselves as the new and old elements together may determine: e.g., certain activities may pass from voluntary to governmental action, like insurance; from State to National control like suffrage; from the purpose of priv-

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ate to that of public profit, like dance halls; from the insanitary to the healthful, like tenement house conditions from the ugly to the beautiful, like American musical development.

5. Historically and temperamentally Americans, whether old or new, have exercised this self-determination in such a way as to leave the largest possible place for private initiative, ingenuity and enterprise. America's problem with the growing complexity of her civilization is to develop a governmental and social system which allows and requires the maximum of voluntary co-operation The newest American settlers are exactly like the original settlers in this spirit of the pioneer, the explorer, of willingness and desire to try the unknown, to sail the uncharted sea. In this common spirit lies the essence and secret of America's remarkable power of assimilation. Americans will continue their unique contribution to the world only as they preserve this opportunity for variations of individual activity while under the necessity of caring for more and more exigencies of life through centralized government. The struggle to maintain such freedom along with the widening scope of government is a fight not yet won between liberty and autocracy.

HANS RIEG: But the main thing, the most essential thing is a thorough understanding of the foreign-born, his traits, his habits, and his institutions, backed by sympathetic endeavor.

To become a citizen of the United States and a full-fledged member of our Nation, is the fundamental, though often dormant, desire of almost every foreigner in our midst. The thing to do is to arouse and intensify this desire to such extent that the individual of his or her own account will seek the opportunities to fulfill this desire.

Don't drive them—beckon to them and lead them!

Don't expect them to change habit and character, language and custom, from the day unto the morrow and bear in mind, that he can be a very good and most desirable American who will still retain a heart interest in his native land, his mother tongue, and the interests of his ancestry, relatives, childhood memories and racial dispositions.

Americanism is not a mere matter of habit, dress or language, but of sentiment and heart.

Advocate the possession, through earning power of mental or physical effort, of land or improved property, of a home and the attractions that accompany it.

Advocate the partnership, formed by being owners of securities in the United States, be they governmental or private. The more the foreigner puts into the United States, the more he will soon realize he gets out of it. The longer and the more he applies his energies to his own selfish pursuits, the deeper grows his interest, with the result that he becomes naturally subservient to exact and proper suggestions not only to be permanently of our country, but as much as possible of our kind.

Let him have his church and his club. his mother tongue and the publications printed in it, but see to it that their pastors and priests, their leaders and their publications ever spread the gospel of "Americans All for America First."

Insist upon the teaching of "the three R's" in either public, private or parochial schools in the language of our land, but don't insist upon depriving them forcibly of the use of their own tongue.

And by all means do not advocate the abolition of their foreign language press, which I consider today the most potent factor of Americanization and the most important part of our public institutions.

The invaluable service which the foreign language press rendered to the Government during the time that we were at war is a matter of indisputable record Not only the Treasury Department, but the State, Army and Navy Departments of the United States recognize it.

What we must have are American papers printed in Polish, American papers published in Bohemian, American papers published in the tongue of Italy, American papers printed in German, etc. Just as the individual who comes to us from foreign shores with the intent to live here and to benefit from the advantages of our land is expected to swear allegiance to the Stars and Stripes and mean it

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when becoming a citizen, so must the foreign language press become permeated with undivided allegiance to but one country. It must be the mouthpiece of unadulterated American patriotism.

No objection should be had to the conveying of information pertaining to the countries from which their readers come, but serious objection should be raised to the treatment—editorially or otherwise—of matters from any other point of view but the American point. It will mean the performance of one of the greatest, noblest missions which can be allotted to anyone. It will mean that the foreign language papers will drive home to their readers, conversing in many tongues, not only the blessings of our land, but also their obligations toward it. It will mean the thorough and expedient unhooking of the hyphen, gradually embracing all our foreign-born within that great big family circle of "Americans All" and for "America First."

H. C. WALLER: Industry can and should supply within its organization a person or persons charged with definite responsibility for developing the best interests of the foreign-speaking employes in the plant. No outside agency can come in and do what this agency from within can do. It is necessary that industry shall stick to its job of production and any work that is done must be so conducted as not to interfere with production, but this has a vital influence upon production, therefore, find a man or men with high purpose, social vision and practical common sense, who will work together with the foreman, assistant foreman, and American workers of industry. The result will be an established point of contact with the foreigner that is bound to be of tremendous value. The men responsible for Americanization in the industry must be men of community vision, not men who are simply creating a department and a job for themselves. This latter point of view would be suicidal to the object desired. For when it comes to the question of instruction of the employes in the knowledge of English, the ideal is the educational leadership of the community, namely, the board of education, and the point of coupling the public educational forces to the industrial power is a delicate one and calls for splendid leadership on both sides. Industry can do more for the promotion of Americanization than any other single agency. In fact, industry must do more, for it is to the best interests of industry that it should be done. The type of community in which a man lives determines more than we now realize the type of production that he turns out. There is, therefore, a compelling economic force which determines industry's place in this great problem.

Today we are facing the problem of a great labor shortage due to natural causes. The fact that foreign labor is returning to Europe is a natural thing but if industry and the community had paid special attention to establishing a sympathetic, intelligent point of contact with foreign labor, the result would have been the establishing of permanent homes in this country on the part of the foreign laborer, to a very much greater degree than has been the case. Only in so far as we are able to establish this personal contact are we going to be able to stabilize labor. Industry must, therefore, take a position of leadership in the problem of Americanization, and where community educational forces do not recognize their responsibility for adult education, then industry must and can take the leadership and furthermore must see to it that there is a change in attitude on the part of the educational leadership in such a way as to meet the needs of the community which they are serving. One emphatic warning is essential in connection with this problem. Force, compulsion, paternalism should be shunned as though they were a plague. We do not want American citizens as a result of compulsion. Friendship is not a thing that can be forced. Friendship is the result of sympathetic understanding. Friendship will result in the building of an ideal community. Understanding will result in the creation of an ideal industrial relationship. It is possible to secure this through the point of contact established in industry through the agency of Americanization leaders.

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Fundamental Principles of Safeguarding

By Sidney J. Williams

Secretary and Chief Engineer, National Safety Council, Chicago

Proceedings of the Eighth Annual Safety Congress

THE first half of my subject is, What Shall I Guard? The second half is, How Shall I Guard It?

If you want your plant to be 100 per cent safe, the answer to the first question is, guard every moving part, wherever located, on which a workman might be injured if he came in contact with it in any way or from any cause whatsoever. If the moving part is in a place "where nobody ever goes," remember that some one is likely to go there sooner or later, in connection with the repair or maintenance or alteration of the machinery itself or of the building, or for some other reason which you cannot anticipate.

A FEW POINTS TO REMEMBER

The second half of the problem is, "How Shall I Guard It?"

1. A safeguard should be so designed and constructed that it will prevent all accidents on the part guarded—not only accidents to the operator while at his regular work, but also to the operator or passers-by in case they slip or fall or carelessly touch the machine.

2. The guard should not interfere with production. If it does, it is liable to be taken off. In designing a guard it is generally wise to consult the man who will use it.

3. In general, the guard should be attached to the machine and not to the floor; if attached to the floor, use a connection which will interfere as little as possible.

4. The guarded part must be easily accessible for oiling, inspection and repair. The door or removable section provided for this purpose should be hinged or otherwise attached to the remainder of the guard or to the machine. If not, it is likely to be left off permanently.

5. The guard should not interfere with cleaning and sweeping around the machine. It should, therefore, be kept generally about 6 inches above the floor.

6. The guard should be strong enough to resist injury and keep its shape. A light, flimsy guard soon becomes bent and is discarded. A substantial guard is cheaper in the end.

7. Incombustible guards are preferred. Wooden guards, soaked with oil, may become a serious fire hazard. Metal guards are neater and wear much better. "Metal guards look as if you wanted to; wooden guards look as if you had to." Guards may be made of cast iron, sheet metal, wire mesh, expanded or perforated metal, or slats. Where subjected to acid or fumes, wooden guards may be necessary.

8. It is desirable to interlock the guard with the operating mechanism, where possible, so the machine cannot be operated unless the guard is in place.

9. A safeguard can often be so designed that it will also serve to prevent wear on the parts guarded; for example, a solid gear enclosure.

GEAR GUARDS

Let us consider the application of these suggestions to the design of gear guards. Cast iron guards are preferred because they may be made to fit more snugly, present a better appearance, and protect the gears from dust and injury. In shops having similar gears on several machines, the cost of patterns and cast-iron guards will be no greater than the cost of "built-up" guards. A cast guard of one machine may be used as a pattern for making guards for similar machines.

Guards for a variety of machines, and in many sizes, may be more cheaply made of sheet metal. In large guards an angle iron is used to make the joint between the flat sides and the curved part of the guard. In smaller guards this joint may be made by cutting projections (like saw teeth) on each side piece and bending those over to form a

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smooth curve. The joint may then be made either by spot welding or by riveting. Short pieces of angle iron may also be used to form the joint—about ¾ x ¾ x ⅛ inch angles, 1 inch long, 3 or 4 inches apart.

Gears should be completely encased; or, where this is impracticable, should have a band guard with side flanges extending inward beyond the root of the teeth. If there is a spoke hazard, the gear should be completely enclosed, or filled in between the spokes.

BOLTS, FLYWHEELS, SHAFTING, LARGE GEARS

Bolts, flywheels, shafting and large gears are often guarded by an openwork rather than a solid enclosure. Such guards should be so designed that no one can get his hand or his finger into the danger point even if he tries. If the guard comes within 4 inches of any danger point the opening should not be greater than ½ inch square, which is small enough to exclude fingers. If more than 4 inches away, which is about the maximum length of a man's finger, the openings may be larger than ½ inch, but not larger than 2 inches square, this being small enough to keep out a man's hand. If a slatted construction is used the slats should not be more than 1 inch apart.

SAFETY ENGINEER'S GREATEST DIFFICULTY

The safety engineer's greatest difficulty is in guarding machines on which men are working. Let me repeat that it is very important not to attempt to guard machines in a way which will interfere with production. The great majority of both foremen and workmen will seriously object to such a guard, will use it under protest and when the opportunity arises they will take it off and not put it back. I have time to mention only two examples—the circular saw and the punch press.

CIRCULAR SAWS

A guard is not the only essential for safety in operating a circular saw. For ripping, it is very important that the saw be provided with a splitter. Keeping the saw sharp and properly set will greatly decrease the danger of throwbacks. The floor where the operator stands should have a non-slip surface.

Many shop men say that it is impossible to guard a circular saw without interfering seriously with operation. The safety rule book of a large company contains a similar statement. In a great majority of the woodworking shops which I have visited, some at least of the saws have not been guarded or some of the guards have not been in use.

I remember, however, two woodworking shops where every saw was guarded and every guard was in use—the Westinghouse Electric and Manufacturing Company, at Pittsburgh, and the Commonwealth Steel Company, at Granite City. There doubtless are others, but I do not happen to have seen them. In each of these two shops every circular saw was provided with a guard which completely covered it when not in use, and which rose automatically from the table as the stock was inserted. I watched men operating these saws and the guards did not seem to introduce the slightest difficulty. They were of very light construction, and when the stock was shoved in they rose without apparent effort; the larger ones, at least, being counterweighted. The men in charge of these departments told me that the guards did not interfere at all with production, and, in fact, that the men now would not work without them because they felt they were so much safer I do not blame the workman or the foreman who objects to using a cumbersome, heavy, non-adjustable guard.

Special work on circular saws sometimes is difficult to guard. In some cases these difficulties may be overcome by careful study. In a few cases they probably can not, and the guard must be temporarily laid aside, being hinged or pivoted for that purpose. Where this must be done another safeguard can often be introduced. For example, in grooving the edge of a board, provide an auxiliary guide or fence, so that there will be a guard on each side of the saw, thus keeping hands away from contact with it.

PUNCH PRESSES

The punch press, using that common term to include all kinds of power press-

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es, has, with the circular saw, the doubtful honor of causing more injuries, and especially more permanent injuries, than any other kind of machine. Where possible, the best guard is an enclosure around the plunger, which makes it impossible to get one's fingers underneath. Often, however, this is impossible. In such a case let me suggest that instead of buying a dozen or a hundred of some so-called safety device, and putting it on every punch press in the shop, you start with one individual press and study the operation carefully in co-operation with the superintendent, foreman, master mechanic and operator of the machine. Ask yourself the question, Why do accidents happen, or, why may they happen on this particular press? The answer will be that, for one reason or another, the operator finds it necessary or convenient to put his hand under the plunger, either regularly or occasionally. The way to make the operation safe, then, is to arrange it so that the operator need not and will not put his hand under the plunger. Some times this may be done by cutting away a portion of the dies so that the operator can keep hold of the part of the piece being formed and still not be injured. Often it may be accomplished by introducing an automatic or a foot-operated kick out. This almost always increases production as well as safety. Sometimes it is found practicable and advantageous to interchange the upper and lower dies. Sometimes the method of operation may be altered; I have in mind one case where, in riveting the handle socket onto a kettle, the operator laid the rivets in position after the kettle was in the machine and sometimes the plunger came down and caught her finger. After a good deal of study the superintendent arranged to have another girl place the rivets in position and hand the kettle to the operator, who then placed it in the press and completed the operation, obviously without danger and obviously with a great saving in time as well. In a great many cases, where the same operation is continued for a long time on one press, it will be found economical to provide some sort of automatic or semi-automatic feed; this also always increases production as well as removing the hazard. Gate guards and two-handed operations are sometimes necessary, but should be used only as a last resort. The methods above are more efficient because they go to the root of the matter and remove the hazard rather than merely guarding it. When you remove the hazard you simplify the operation and therefore increase production. When you merely guard the hazard you may decrease production.

STUDY OF THE OPERATION OF MACHINE

What I have said of the punch press is typical of many machines. Safety engineering does not consist in simply building wire mesh guards, nor in buying safety devices which look pretty in a catalog, and putting them on the machine without regard to the wishes, the convenience or the efficiency of the operator. The real safety engineer will, where necessary, study the operation of a machine until he understands it as well or better than the operator himself—as well as the foreman, the superintendent, the master mechanic; and then he will apply their brains and his own in working out either a guard or a change in the machine or a change in the operation, which will remove the underlying hazard and make the operation intrinsically safe.

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Plant and Machinery Layout Affecting Accidents in Textile Mills

By Kenneth Moller

Lockwood, Greene & Co., Boston

Proceedings of the Eighth Annual Safety Congress

ACCIDENTS in a cotton mill due to a faulty layout of machinery are usually caused by crowded conditions, poor lighting, poor routing of work, and poor arrangement of drives. These are caused in an old mill through necessity or through a sense of false economy. In a new mill, there is no reason for these conditions except the question of false economy. There is always an instinct to get the maximum production from every square foot of floor space, and there is a very strong idea that the only way to get maximum production is to put a machine on every square foot. This is absolutely not true. In your crowded spinning room, you could probably get pounds more product, besides eliminating the accidents which are bound to occur in a crowded room, if you took out some of your machinery and rearranged the rest. Be sure to leave ample alley room and spare floor. You must have space to handle product in process of manufacture as much as space for the manufacturing itself. This space is just as much an adjunct of manufacturing as the space occupied by machinery and do not skimp it. Have perfectly definite space where full and empty trucks must be kept and insist upon their being kept there. A good plan is to have stalls marked out on the floor and insist that trucks be not left in the alleys. A better way yet is to use conveyors wherever possible even if it does not reduce the number of men necessary for handling the product. They get the work away from a machine as soon as it is finished and deliver it to the next machine. They keep the work in perfectly definite channels and out of the alleys. You will find that this system has a big effect on reducing accidents.

While all working alleys must be kept wide, all other spaces where people are not supposed to go should be so small that it is impossible for anyone to go there. There is always an instinct to take short cuts. Do not have any short cuts. Make it so people have to use the main alleys and make those safe.

PERILS OF POOR LIGHTING

Next to congested rooms, probably one of the greatest causes of accidents is poor lighting. There are a few simple rules which will have a big effect in reducing accidents from this cause. First, try to have working alleys run across the mill so that light from the windows will shine down the alley and there will be a window at each end. Second, spend money in keeping the mill painted. You get accidents in old dingy mills and you get poor production. A coat of paint at least once in two years will always pay for itself in increased production and saving in artificial light. Where possible, use general lighting and where this will not work out, use individual lights in the alleys but too high for the help to touch. Keep the windows clean. It is a very cheap way to get light and light always means increased production and decreased accidents.

Keep the mill clean. Dirty floors strewn with bobbins cause accidents. Scrub floors but be careful when scrubbing that people do not slip. This is hard to do and must be handled through your education campaign.

SEATS, LOCKERS, PURE AIR

Have seats for your help. Accidents are caused very largely by fatigue. Tired people are careless people. Have rest rooms for them and let them use them.

Have adequate locker rooms where all clothes must be kept and do not permit dressing around machinery which the

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help will do if you do not provide facilities for them to do so elsewhere.

If you have done all of the above things, do one more thing. Have a thorough and complete inspection of the mill once a week to make sure that all these facilities are being used; to be sure that everything is in repair; that there are not loose and broken planks in the floor and that proper order and cleanliness prevail. Absolutely the only way to do it is to keep everlastingly after it.

One thing more you must have—the proper atmospheric conditions and ventilation for the help to work in. I believe that this has a big effect on the accident rate in keeping the help in proper physical trim and we all know that it helps production.

It is hardly necessary at this day to say anything of hospitals and first aid rooms. These are taken for granted.

PRINCIPAL ELEMENTS FOR SAFETY IN COTTON MILLS

To sum up, the principal elements which go for safety in a cotton mill layout are:

(1) Proper lighting both natural and artificial.

(2) Proper alleys which are obviously to be used and which are as convenient as short cuts.

(3) Proper spare floor for trucks and goods in process without crowding.

(4) Proper heating and ventilating.

(5) Proper dressing, toilet and rest facilities for the help.

(6) Proper upkeep and use of all of these after they are installed.

There seems no doubt that with due consideration given to these elements we will get the maximum safety for the employes and maximum production for the owners.

Industrial Nurse's Responsibilities and Opportunities

By Florence Swift Wright, R. N.

New Jersey State Department of Health, Trenton

Proceedings of the Eighth Annual Safety Congress

AS an industrial nurse should acquaint herself as rapidly as possible with the processes of the industry, she should make herself familiar with its less obvious health and accident hazards and with the indirect effects of work and methods on the vitality and future health of the workers.

Her responsibilities are:

(1) To herself, that she develop her powers.

(2) To her employers, that she perform faithfully what they have seen for her to do, while demonstrating the economic value of broader activity.

(3) To the workers, that she serve them acceptably and with the authority that will win their heed to her teaching.

(4) To the industrial physician, that she carry out his medical orders exactly and that she co-operate with him in all matters.

(5) To the community, that she act in the best and broadest meaning of the term as a good and progressive civic as well as industrial servant.

Today the trained nurse is employed in mining settlement and bank, laundry and hotel, tannery and department store, rolling mill and candy factory, packing house and silk mill. Her duties are equally varied. We find her giving first aid and assisting the industrial physician; caring for the sick in the home and teaching there bedside nursing, home management, child care. She is equally concerned with accident prevention, sanitation, health education, employment problems.

In the plant she may have a large responsibility in searching out the more remote causes of injury, illness, and unhappiness, together with an obligation to enforce precautionary measures. Her

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contact with the workers in plant and home, her neighborly, personal service to them, puts her, if she respects their racial traditions, in a position to demonstrate the wisdom of change in habits which will make for healthy, rational life. If she is wise, she will not seek to do this by uprooting cherished custom, but by friendly interchange of ideas will strive to alter only that which is actually harmful while preserving the good to enrich our own national life. She will not fall into the error of the social worker who, returning from a visit to an Italian family, reported that they were not yet Americanized, as they were still eating Italian food. She will teach her American friends the value of Italian salad, French soup, Swedish bread, Hungarian stew.

She will, by her understanding of the parents, strengthen family ties by fostering in the minds of the young people respect for the opinions and customs of their elders, the loss of which is often a sad feature in the lives of the foreign born which is the direct cause of much lawlessness among those of foreign parentage.

How shall the industrial nurse meet her responsibilities and seize her opportunities? By co-operation, first, with her employer, who, if she gives evidence of ability and if she is careful to show by means of facts, through her records and reports, the wisdom and economy of each step she takes, will allow her reasonable initiative and freedom to cooperate with other department heads in the plant and who will aid all she does to become an efficient employe, a helpful friend to her fellow workers and a capable assistant to the industrial physician.

Industrial Democracy

Employes' Representation in Determining Working Conditions

Proceedings of the Eighth Annual Safety Congress

[Abstracts of three papers: "Co-operation and Industry Progress," by Cyrus McCormick, Jr., Works Manager of the International Harvester Company; "Experience of William Demuth & Company in Industrial Democracy," by F. L. Feuerbach, Factory Manager, and "Practical Aspects of Employes' Representation," by E. B. Tolsted, of the Independence Bureau, Philadelphia.]

CYRUS McCORMICK, JR.: Not many years ago the doctrine of *"caveat emptor"* ruled every economic transaction and the business world was permeated with the ethics of David Harum. Just as that doctrine has vanished, so now is vanishing the fear of collective bargaining, and we find ourselves not only admitting the right of workmen to participate in the determination of working conditions but also discussing how this right may be most surely exercised. The method finding most favor in this country can perhaps best be classified by simply calling it Employes' Representation.

In the recent labor difficulties in Chicago, employe representation was forced to stand an acid test. We have 8 plants in Chicago, in 7 of which there are works councils. Due to various causes, such as strikes in large neighboring establishments and the presence of a large number of non-American groups of employes, a strike was begun in that plant where there was no works council. When these men, without making any demands, were out upon the street, they proceeded in a body to adjacent factories where there were works councils. The day before this took place the councils in these other plants had negotiated a settlement between the men and the company, which satisfactorily adjusted all questions at issue. In spite of this adjustment the intimidation of the large number of foreign employes from the striking plant, and the slugging which immediately took place, caused the works councils in 4 of the remaining plants to advise the cessation of operations. The company accepted the request, and for 3 weeks these

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4 plants were closed down. The period would not have been so long had there not intervened the terrible race riots and a street car strike. When conditions were right and the works council felt it desirable and safe to resume operations, the plants were reopened. It is at least significant that the resumption of work took place with hardly a ripple of excitement, and with no violence of any kind. In two other plants the adjustment was never questioned from the beginning. We, therefore, found as a result of this labor difficulty that our works councils were stronger in the minds of the men than ever before. They stopped work in the plants when it was dangerous to continue to operate. They opened the plants when it was safe to do so (even taking it upon themselves to arrange for the preliminary police protection) and in every way proved themselves worthy representatives of the best traditions of American industry.

AMERICAN AND ENGLISH SYSTEM

Employe representation has spread more rapidly in England than it has in this country, but it has taken a different form. Much has been written about the so-called Whitley plan. That may be desirable for England, but it will not do for this country. Here neither industry nor labor is sufficiently organized to set up the elaborate system of councils required under the Whitley plan. Nor is our government sufficiently versed in the handling of industrial matters to take as important a part in industrial councils as is required under the English system. Finally, the Whitley plan has organized British industry into two opposing camps, whereas the American system of employe representation is based solely upon mutual co-operation and a substitution of vertical for horizontal divisions. Class prejudice has no place in this country, either in society or in industry.

REPRESENTATIVE DIRECTION FUNDAMENTAL

After all is said and done, the fundamental point in our industrial trend today is the representative direction of industry; all else is really detail. Profit sharing may come when it is ripe for it to do so. Governmental action or rearrangement of our program of consumption may make it possible for employes to be free of fear of unemployment. Education may raise the standard of working conditions to a real art. But if workmen are allowed self-government they and their employers together can work out these programs. If not, they will never enjoy them. If the step of accepting employe representation is now taken by the American industry as a whole, the future is secure. The working out of all details can be safely left to the joint deliberations of that active intelligence, which, common to both men and management, has placed American industry where it is.

F. L. FEUERBACH: Realizing the need of a better understanding between our employes and ourselves to stimulate an interest in their work and clear from our industrial pathway some of the difficulties which you all have faced from time to time, we installed, about 2½ years ago, a system or organization government, generally termed and known as Industrial Democracy.

CABINET, SENATORS, AND REPRESENTATIVES

We took as example the United States Government, which, having been successfully established and carried on for more than 140 years, seemed a pretty fair guide. We have a Cabinet, Senate and House of Representatives. The Cabinet consists of the executive officers of the company, with Mr. Demuth, as president, of the company, acting as its chairman. This body is not elective, its personnel existing by virtue of position in the organization. It is primarily an executive body, and while it has the power to veto, the same has never been used, there being no occasion for it. It also has the power to initiate legislation, by making suggestions in a message to the Senate or House of Representatives, which, of course, may or may not be accepted.

The Cabinet meetings have before them the bills which have been passed by the Senate and the House, and also the minutes of all meetings and discussions, which give a very clear conception of what is in the minds of our people. The Cabinet deals with the larger and

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more intimate problems of management, which would naturally come before a meeting of executives. Any desired change affecting employes in the least manner is not framed as an order, but put in the form of a suggestion, stating the reason for same very frankly and clearly, and is sent to the Senate or House. No matter what its fate may be, it is sure of a full and complete discussion from every possible angle, and if the measure be rejected, the executives may rest assured that they have been prevented from issuing an erroneous order and saved from the results thereof.

The Senate also is not an elective body. It is made up of about 30 foremen and heads of departments, who are in positions of authority over the workers themselves. It elects a president, vice-president, secretary, and sergeant-at-arms, and standing committees, and special committees as the occasion may demand. Its power and practices are identical with those of the House of Representatives.

The House is the popular body of government, being elected by secret ballot by the whole body of workers. Each department has representation—30 workers electing one representative, either man or girl. The representatives are supposed to act as counsellors within their departments, receive all complaints and suggestions from their fellow workers and in turn acquaint them with the doings of the legislative bodies.

The Speaker of the House is elected, and he appoints committees, through whom business is transacted to a considerable degree. Each measure is generally referred to a committee to investigate and report, so that when the time comes for open discussion, all available facts will be at hand.

WEEKLY MEETINGS

The meetings of the Senate and House are weekly and always in the company's time, which we consider very necessary for the success of the undertaking. A set of by-laws has been devised for the use of both bodies by a joint committee, and all their business is transacted in accordance with same. Any question affecting working conditions, safety, sanitation, wages, piece-work rates, etc., is brought up before either of the 3 government bodies, and any recommendation decided upon after a careful discussion and deliberation is brought to the next body for their action. No change becomes a law until it has been approved by all three bodies. In that way we believe we have found a much better way of feeling the pulse of our people, in learning what they desire, and in avoiding difficulties rather than curing them, which is usually the case in the ordinary shop committee plan. We do not wait for the trouble to culminate, for the sickness to develop. The men hear the report and progress of their respective departments, learn about the troubles of another department, and are helping their fellow workers in getting over any difficulties that they may experience.

We can clearly see the actual formation of a threatening cloud. The open discussion of any dispute has never failed to avoid accumulation of such clouds and outbreak of storm.

ADJUSTMENT OF WAGES

Permitting the men to have a say in adjusting their wages removes this perplexing question as a field of dispute. The fairness with which the members of the House have always considered and handled all questions of this sort has been most remarkable, and has come to us as a complete surprise. Our experience has shown us very plainly that people learn to be responsible by exercising responsibility; learn to participate in decisions by participating in discussions—even though the experience may at times seem costly to all concerned.

I will give one little example that will show very clearly how Industrial Democracy and the wage question work together.

Last fall 25 men of one of our departments were somewhat influenced by an outsider who had formerly worked for us and was then working for a competitor. He advised them that this would be an opportune time to strike for more money. The matter was brought to my attention. I called the boys together and said to them: "If there is

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anything that is not satisfactory, bring it up in your House, through your representatives. That is the place to air all your troubles and bring your difficulties. The next day, I am glad to say, the representatives of that particular shop came to the House and presented their case. A committee was appointed to investigate the matter and report at the next meeting. The committee came back with quite a detailed report, after having gone to the office to obtain figures as to the rate of pay a year ago, 6 months ago, and 3 months ago, and having convinced themselves of the true facts, reported back to the House of Representatives:

"We do not favor any change of piecework rates for this department, because we find that the men are absolutely unfair in their demands."

E. B. TOLSTED: There are at the present time about 150 employes' representation plans in operation in the United States. The details of many of them have been published in pamphlet form or in current magazines.

Industrial representation is in successful operation in plants varying widely as to process and products, size and complexity of organization, and as to the character of the working force. None of these factors seems to determine the success, although each of them affects it and must be taken into consideration in working out the application of any plan to particular needs.

A FEW SUGGESTIONS

Here are a few suggestions which I think it would be well for every one to consider when contemplating a plan:

Install it under peaceful conditions One large company inaugurated a plar as the result of a strike, and the plan ended in another strike some time later. The company is now attempting to make a new start. To propose a plan to men on the verge of a strike is also most certain to result in failure to win over the men.

To attain its highest success, a plan should be developed gradually, each step in so far as possible resulting from suggestions or requests of employes. By all means, do not impose a ready-made plan; let the men help work it out; it will be a better plan and they will feel that it is their own. Remember the attitude of our forebears toward English-made laws applied to the colonies. And no matter how good the plan seems to be, actual use will show need for changes.

See that the plan is simple in form so that procedure under it is easy to understand and to carry out. As to the specific form, we find that the best results have been obtained with the joint-committee. But give opportunity for free discussion, that is, discussion without the presence of the management. It has been found good practice to alternate joint and separate meetings, with final action taken only in joint meetings. At a banquet held recently by the Standard Oil Company of New Jersey for the representatives of the men and the management, one of the employes' representatives suggested the establishment of separate boards for the management and the men. This action was not especially desired by the representatives, who had already taken up the subject once and voted against separate boards, but the men felt that their delegates would not speak freely before their "bosses."

COMMITTEES AT WORK

In some plans the committees deal only with working conditions and welfare work, such as light, ventilation, locker rooms, etc.; in some they deal with all matters which directly concern the worker, including wages and hours There are drawbacks to both plans. On the one hand, committees which have been restricted in their activities have grown restless and felt that they were deprived of their just rights. On the other hand, committees which have been given free sway have sometimes failed to use judgment in the determination of hours and wages. In one plant, it is said that wages were forced up, despite the company's claim that they could not meet an increase. The reply of the men was "Raise the price of your product." Experience would seem to show that a middle course works best. Give your committee supervision over working conditions and welfare work; educate them through the use of this function to a

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better understanding of the position and problems of the management; then as they show themselves capable of handling the more serious problems, extend their authority toward grievances, hours, wages, absence, cost of living, community conditions, etc. In most cases, it will be found that the desire for a wider scope of activities will go hand in hand with the growth of ability to handle the bigger subjects.

We advise that every employe, man or woman, citizen or alien, be made to feel as far as possible that he has a part in the operation of the plan. In one plant, voting was restricted to citizens, but all were, of course, allowed to present grievances. A group of foreigners did not understand this point, and struck because they thought they had no means of presenting their grievance. After the plan has been formulated be sure that every employe knows what it means and who made it. The men first consulted will advise as to the best method to be followed. Use the plant organ again and again to supplement word-of-mouth publicity. Do not hurry at this, or, indeed, at any point. Frequently the management fatuously prides itself on its excellent plan, when the men know nothing about it. In a plant which we visited several months after the installation of a representation plan, almost half the men who could not speak English either did not know of its existence or had no idea of its purpose.

NO INTERFERENCE WITH UNIONS

It is especially important to make it plain that the plan in no way interferes with membership in unions or with existing relations of the management with labor unions.

Keep adequate records of all meetings and make them accessible to all. The main decisions should be posted on bulletin boards in each department and published in the plant organ.

Usually best results follow holding meetings during working hours. In one case, which has come to our attention, the representatives requested that the conferences be held out of hours, as they would feel less constraint in voting as they pleased. As a rule, however, committees which meet outside hours have failed to hold the interest of the representatives.

This lack of interest is one of the foes of employes' representation. Many feel that after the first enthusiasm attendant upon any new enterprise has worn off, the committee will fall into the apathy characteristic of so many committees. This has not generally been true. It should never be the case, for the matter is of vital interest to both sides. As with any other form of human activity, the success of a plan is in a large measure dependent upon the standing and capacity of the men who sponsor the plan. The best men and their best efforts are the answer.

CONFIDENCE AND CORDIALITY

The degree of success or failure of any plan of employes' representation depends not upon its form, the size of the company, the nature of the industry, or the character of the working force, but upon the understanding, by both the management and the men, of what the plan means at its inception; by the management, of where it is likely to lead; and upon the degree of mutual confidence existing between employer and employes. There must at least be a foundation of confidence and cordiality if the management and the men are to strive together toward an industrial ideal.

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EDITORIAL

EIGHTH ANNUAL SAFETY CONGRESS

IN retrospect the Eighth Annual Safety Congress looms even greater than it promised. Much was accomplished of a constructive character. The educational work to be started in the public and parochial schools will have a far reaching effect and it is characteristic of the energy of the organization that the curtain was barely rung down on the 1919 Congress before that work was underway and meeting with the heartiest public response.

President Richards is one of the old-timers in the National Safety Council and in the safety work of the Nation. He is conversant with all that has been thought and done by his predecessors, has had an important part in previous administrations and takes up the reins of control with an intimate knowledge of the road to be travelled and the destination to be reached. He is to be congratulated upon having an organization almost ideally constituted for effective and prompt execution of his presidential plans.

Few cities are capable of stretching themselves sufficiently to accommodate the annual National Safety Congress with as little crowding as Cleveland felt and not many hotels are arranged to give as many comfortable meeting rooms for the numerous simultaneous sessions that were held at the Statler.

If the National Safety Council continues to grow as it did under the presidency of Mr. Van Schaack it will be a problem where to hold the congresses of coming years. President Richards voiced this thought. Moreover he let his hearers peep into a vision of a future home for the Council—with a vast auditorium and a whole series of committee rooms to accommodate the great congresses to come.

AMERICAN SOCIETY OF SAFETY ENGINEERS

SAFETY ENGINEERING is complimented by The American Society of Safety Engineers by being chosen as the official journal of the society. The formation of a society that will wholly devote itself to the prevention of accidents through engineering methods is an important event in the progress of the safety movement. The object of the new society is declared in Article 2 of its constitution:

> The object of the Society is to promote the Arts and Sciences connected with Engineering in its relation to Safety for Life and property. The achievement of this purpose shall be through the holding of meetings for the reading and discussion of professional papers and for social intercourse; the careful consideration and determination of technical Safety Engineering problems, including the adoption and application of safety standards; the publication and distribution of its papers, discussions and determinations; the maintenance of a library devoted to its particular requirements, and helpful co-operation with official and other bodies.

The A. S. S. E. is destined to rank in size of membership as well as in the professional standing of its members with the older engineering bodies of the country, such as the American Society of Mechanical Engineers, the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Institute of Mining Engineers, and similar organizations. Its proceedings and growth will be fully reported in this magazine from this date forward.

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RESPONSIBILITIES OF THE SAFETY ENGINEER

TWO outstanding addresses on the duties of safety engineers were delivered at the recent National Safety Congress, Dr. Chaney's "Is Industrial Death Necessary?" and Mr. DeBlois's on "Supervision as a Factor in Accident Prevention."

Dr. Chaney is a steadfast advocate of "engineering revision"; he believes that the method of estimating industrial hazards by means of a frequency rate is inadequate; he thinks that the factor of "personal carelessness" has been somewhat overstressed; he is positive that the severity rate is of fundamental importance; he believes that all important savings in accident cost have been brought about by engineering revision, and cites instances to demonstrate the accuracy of his opinions and conclusions. Of course, all readers of SAFETY ENGINEERING will read every word of Dr. Chaney's address, published in this number.

Death is the great element in accident cost. Investigations by the U. S. Bureau of Labor Statistics show that 57 per cent., possibly even 65 per cent., of deaths and major mutilations could have been prevented by proper engineering measures. Dr. Chaney's conclusions regarding frequency rate and severity rate:

1. The general frequency rate is an index of the prevalence and fluctuation of minor injury. The reduction of this type of injury depends on an educational program whose final effect is to cause the men to do their work in a safer manner. A rising frequency rate may indicate one or all of three conditions: (a) no educational program or a poor one, (b) a good program administered with poor judgment or with insufficient vigor, (c) industrial conditions which might for a time overbalance any program however good.

2. The general severity rate is an index of conditions in regard to death and major injury. The reduction of this type of injury depends in very large measure upon the procedures included in the expression "engineering revision." When the severity rate rises there should be immediately a very searching inquiry for possible imperfection in the engineering program. It is almost certain to be discovered that some unobserved lacks on the engineering side are responsible for the rising rate.

Dr. Chaney's remarks are a challenge to the safety men of America to apply every known and ascertainable engineering remedy to reduce the death toll of industry.

Mr. DeBlois argued that engineering revision must be followed and kept effective by continued supervision by safety engineers; for example, space and light conditions must be maintained and safeguards must be kept in place and in good condition. Engineering revision without supervision is almost impossible of conception.

By a process of analysis described by Mr. DeBlois in his address, published on another page, 71 per cent. of the blame for fatal accidents may be placed on the management, in contrast with Dr. Chaney's 65 per cent. Mr. DeBlois, however, analyzing further, made 37 per cent. of fatal accidents preventable by engineering revision and 34 per cent. avoidable by better supervision.

Both speakers were in accord with regard to the value of educational work to create and maintain the interest of workmen in safe practices. Dr. Chaney thinks that educational effort should be directed primarily to the development of skill rather than of caution. Mr. DeBlois criticises managements that have not seriously made safety a part of the business of production, that have put on safety as a sort of sideshow; although meetings are held, literature distributed and committees appointed, such managements have caused workmen to look upon the plant's safety activities as "something outside the big tent." He tells how an accident prevention organization can be made effective, without conflict between production and safety, under the supervision of a real safety engineer.

The arrival of the safety movement at a point where the best results are to be looked for only when skilled engineers are charged with responsibility for the protection of lives and limbs was emphasized by both speakers.

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HIGH INTENSITY LIGHTING

To the Editor of Safety Engineering:

SIR: In an editorial which appeared in the August issue the following statement was made with respect to artificial lighting:

> "Finally there arose someone who combined with his electrical skill a knowledge of physiology, and he enunciated the then novel dictum that too much light was as bad as too little, that the best lighting was an intensity that caused only normal dilation of the pupil of the eye, and which came from the right direction in the right amount."

While this may be sound theoretically, it can scarcely be justified from a practical standpoint. Let us consider for a moment the range of intensities which are normal to daylight. An investigation* conducted in New York City during the months of August and September showed a maximum daylight intensity of 12,000 foot-candles, and a maximum moonlight intensity of 0.014 foot-candles.

From this it is evident that the eye, in the normal process of vision, is called upon to adjust itself for a wide variation of intensities. At the very high intensities a blinding sensation is produced, which causes eye-strain and obliteration of detail, because of the large volume of light entering the eye, the greater part of which is reflected from objects in the field of vision. The discomfort, however, is generally attributable to the undue brightness of these objects, as in the case of sunlight reflected from snow, water or other surfaces which reflect rather than absorb the greater part of the light falling on them.

At somewhat lower intensities glare is dependent to some degree upon the contrast in brightness between the source of annoyance and surrounding surfaces. This may be illustrated by the fact that, although automobile headlights as seen at night against a dark background are likely to be so glaring as to be temporarily blinding, the same headlights would scarcely be noticed in the daytime.

*Trans. I. E. S., Vol. 3, page 484.

At the lowest ranges of intensity obliteration of detail and consequent eye-strain are again experienced, because of the absence of sufficient light.

Coming back now to the question of artificial illumination, we find it evident that the light sources and equipment available for practical installations could not possibly be used to produce intensities measured in the thousands or even hundreds of foot-candles. In the design and installation of high-intensity systems of artificial illumination there need be no worry about too much light, for that is automatically taken care of. The relatively narrow range of intensity in artificial lighting is located at the lower end of the wide intensity range encountered in normal daylight. Too much attention cannot be given, however, to the avoidance of glare, the most common fault in the whole field of illumination design. The casual observer who enters an industrial plant and feels eye-strain is very apt to condemn the lighting with a remark that "there is too much or too little light"; whereas, if an analysis of the situation were made, the criticism would be "there is too little light and too much glare."

EDWARD DUB. STRYKER, JR.

COMPLETE FIRE PROTECTION

To the Editor of Safety Engineering:

SIR: A famous underwriter once said: "Fire protection, to be effective, must be complete since 98 per cent. of efficiency may be vitiated by 2 per cent. of oversight, carelessness or omission." The current report of fires and losses issued by the Boston Mutual Fire Insurance Company cites a case in point:

The Wadsworth Manufacturing Company of Detroit makes automobile bodies. Its No. 6 building was of light mill construction, 6 stories in height and divided into 3 sections by 12-inch *single* fire doors operated by fusible links. The whole building was filled with highly inflammable contents and was equipped with automatic sprinklers, fed from a 50,000-gallon tank and the

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city mains; the latter, however, have a normal water pressure at this point of but 15 to 20 pounds.

In August of this year fire occurred on one of the upper floors and *spread through the wall openings* of the different sections, the result being the opening of such a large number of sprinklers that without doubt the water in the sprinkler tank was quickly exhausted, after which the fire had its own way, and the final loss was about $1,250,000.

The regulations of the National Board of Fire Underwriters for the protection of wall openings say, in Class A, Section 1, Rule 3: "Each side of the wall at every opening in an interior fire wall shall be provided with an approved self-closing or automatic fire door." (*This was not done.*)

Further, Class A. Section 1, Rule 14, says: "Where the conditions are such that the spread of fire through the wall openings is *likely to be very rapid,* or where the spread of fire through wall openings is likely seriously to endanger life, the fire doors should be operated by an approved automatic quick-operating doorclosing device or system. (*This likewise was not done.*)

The Wadsworth Manufacturing Company was a property that *nearly* had fire protection, and a small percentage on top of what had been already spent would have completed the job. As it was, that which was done availed nothing. Doors on both sides of the fire wall are but a small fraction of the cost of the wall itself, and means for operating such doors in the shortest space of time are not only available, but are specifically required by the National Board in just such cases.

It would be interesting to know how many other plants are following in the footsteps of the Wadsworth Manufacturing Company—plants with a high fire hazard, very inflammable stocks, and fire protection that is almost, but not quite, complete. H. D. G.

INDIFFERENCE TO SAFETY

To the Editor of Safety Engineering:

SIR: The writer has had occasion lately to visit a number of plants ranging in size from 400 to 3,000 employes.

Many an object that otherwise would be passed unnoticed comes to the attention of the eye trained in looking for accident hazards. Understand, I was not making an inspection or looking for hazards, but the invitations to injury were so pronounced and so numerous as to cause surprise that the employer would permit such conditions to exist—unprotected gears and belts, the careless stacking of material and poor flooring, all common hazards. In two plants it was as customary to see the operators of planers ride their machines as it was to see them register their time cards.

As a former safety man who has spent much time studying and analyzing the causes of accidents and their prevention, and who had succeeded in driving home to the employes of a large industry the "Safety First" habit, the utter indifference to safety on the part of both employer and employe made a big impression upon the writer.

No effort was made to educate the employe by means of bulletins, and some plants did not maintain a first aid room. With plants where the latest devices for fire protection and prevention had been introduced being wholly neglectful of human beings, it seems as though there is a great deal more to be done in the educating of the employer to the prevention of industrial accidents.

H. E. W.

Providence, R. I.

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Safety News and Comment

World-wide Engineering Standards

AT a dinner given on September 18, in honor of Charles LeMaistre, secretary of the British Engineering Standards Association, by the American Engineering Standards Committee, attended by more than 50 engineers representing practically every organization interested in the development of standards, the guest of the evening expressed the opinion that one of the strongest ties which can bind two or more nations together is engineering and industrial standardization.

Following Mr. LeMaistre's address Chairman Adams called for responses. Dr. C. O. Mailloux spoke as the chairman of the American Committee of the International Electrotechnical Commission. Nelson P. Lewis, past president and representative of the American Society of Civil Engineers, pledged the support of his society. Professor Charles F. Scott reviewed the beginnings of electrical standardization in America, which he regarded as the basis of international electrical standardization. Edwin M. Herr represented the American Society of Mechanical Engineers and spoke for that society. Guilliaem Aertsen of the American Society for Testing Materials emphasized the necessity for developing team work. Dr. S. W. Stratton, director of the Bureau of Standards, reiterated the readiness of the Government departments to co-operate. Charles M. Manly, president of the Society of Automotive Engineers, pledged his society.

Professor Ira H. Woolson represented the National Board of Fire Underwriters. A. Cressy Morrison spoke for the National Safety Council. G. H. Ramsdell told of the standardization work of the American Gas Association. B. F. Waterman represented the American Gear Manufacturers' Association. Chas. W. Baker spoke for the technical press. D. Knickerbacker Boyd told of the great need of standardization in building materials and design.

Fire Prevention in Canada

FOR the first time in its history Canada this year had a Fire Prevention Day. The day chosen was October 9. A royal proclamation was made by the governor general calling attention to the fire loss and the possibility of reducing it. This gave the sanction of the whole country to the work of propaganda carried on to popularize and enforce the fire prevention idea. Under the direction of the Dominion fire commissioner, J. Grove Smith, who is now established in his office with a competent staff forming for his support, all organizations that could help in spreading the gospel of fire prevention were pressed into the service, including the whole school system from primary class to university Every form of publicity was used in the campaign. One of the great points of the propaganda was to make the fact widely known that the newly amended law makes the careless person who causes fire a criminal and subjects him to severe penalties. The results thus far are summarized in a statement by the fire commissioner:

> Fire Prevention Day, 1919, was observed in about 26,000 schools; demonstrations, clean-up campaigns and other effective methods were employed by over 300 fire chiefs; 79 municipal councils passed resolutions approving the official observance of the day; special inspections on forms supplied by this office were conducted in over 6,000 factories, warehouses and large properties and suitable literature was distributed to the employes of these concerns; 785 newspapers carried matter issued by this office and by the provincial fire marshal departments, 423 made editorial mention of the campaign and 64 dailies in the larger cities and towns of each province gave a full page spread on October 8. Up to date, 735 factories have signified their intention of instituting a permanent monthly inspection system under our direction, and 405 have undertaken to use our leaflets in all employes' pay envelopes during the next 12 months.

There will be a "follow-up" in the form of meetings and conferences to be held in the principal cities of the Dominion from coast to coast which began

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on the Pacific at Victoria, B. C., on November 10, and will conclude in Halifax or St. John, on the Atlantic, shortly before Christmas.

Back to Pre-War Jobs

THE War and Navy Departments are awarding official citations to patriotic employers who have re-employed or promised to re-employ all of their employes who entered the service of the Army or Navy during the great war. The War Service and Information Branch of the War Department is engaged in placing demobilized service men back in civil life in satisfactory positions and looking after their interests generally. Fully 80 per cent of all the discharged service men went back to their pre-war jobs on demobilization.

Factory Lighting Codes

AN electric lighting code for Illinois is being prepared and will be introduced at the next session of the Legislature of that State. Its adoption is expected.

Fifteen States have factory lighting codes which have brought about greatly improved and increased production, a reduction in the number of accidents, greater efficiency in workers and their output and better working conditions, which make for more contented workers.

The glare and flare of too strong lights in shops where there are dangerous machines or spots are the cause of hundreds of accidents that maim and kill workers annually.

Workmen's Compensation, Canada

THE questions involved in the making and enforcing of laws to provide for the compensation of persons affected by industrial accidents were prominent at the sixth annual meeting of the International Association of Industrial Accident Boards and Commissions, held in Toronto, Canada, September 23-26. Nearly all the provinces of Canada have such laws, and the administration of these statutes is developing a body of experience and precedent which is becoming very valuable. D. L. Case, editor of the *Railroad Trainman,* brought out the fact that, while Canadian railroad men favor the compensation laws, the opinion among those of the United States is quite the opposite, except in the case of the locomotive engineers. John Mitchell, late chairman of the New York State Industrial Commission, and Royal Meeker, United States Commissioner of Labor Statistics, pointed out defects in State compensation laws and their administration which may possibly help to explain the attitude of the railroad men. It was strongly urged by those who favored compensation laws that the effect of their operation was greatly to reduce the accident ratio in every industry to which they applied.

National Tuberculosis Association

BECAUSE of the disclosures of a recent Nation-wide survey, the National Tuberculosis Association has started an intensive campaign to combat what experts declare is a danger of increased prevalence of a disease that now causes 150,000 deaths every year. The facts most alarming to the experts are that there are more than a million active cases of tuberculosis in the United States, and that the health demonstration at Framingham, Mass. where 11,000 persons were examined, indicates that the unsuspected cases greatly exceed the known.

In the campaign now getting under way it is planned to educate the people everywhere as to just what tuberculosis is, that it is communicable, not inherited, and that it is both preventable and curable. Emphasis is to be laid on the building up of the bodily resistance to the germs of the disease by spending as much time in the open air as possible by eating good food well cooked, and by sleeping in well-ventilated rooms. Communities will be urged to press the work of searching out unsuspected cases, and to provide dispensaries, hospitals and sanatoria in sufficient numbers to assure treatment for all the afflicted.

Funds for the campaign are to be

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raised by a 10-day sale of Red Cross Christmas seals, beginning December 1 The amount needed to carry out the comprehensive plans adopted is approximately $6,500,000, all but a small portion of which will be expended in the communities by which it was contributed The National Tuberculosis Association calls the seals "Safety First" stamps, and asks everybody to join in a movement to promote their sale.

V. T. Noonan Is Boston President

AT a meeting of the executive committee of the Boston Local Council of the National Safety Council on October 30, Victor T. Noonan, director of safety, Fore River Works of the Bethlehem Shipbuilding Corporation, was elected president of the Boston Council, succeeding W. C. Swift of the Standard Woven Fabric Company, Walpole, Mass., and G. E. Sanford of the General Electric Company, Lynn, Mass., was elected vice-president of the Boston Council. The executive committee of the Council pulled off a nice little surprise on Mr. Noonan when the committee, by a quick unanimous vote, elected him.

Railroad Drive For Safety

BY direction of the Director General of Railroads, United States Railroad Administration, October 18-31 was the period for a Nation-wide accident prevention drive on steam railroads. The Railroad Administration planned to bring to the attention of all railroad employes the possibilities of avoiding suffering and the loss of life through accident, provided due thought and care are exercised.

The railroads of the United States constitute practically a "workshop" extending from the Atlantic to the Mississippi River and from the Potomac and Ohio Rivers to the Great Lakes.

Systematic accident prevention work has resulted in a decided diminution of railroad accidents since February 19, 1918, when the Railroad Administration took charge. During the special safety fortnight every possible means for keeping the subject of safety before railroad employes was brought into play.

Bulletin boards displayed appeals, posters, photographs of actual accidents, and statistical data; letters and time cards were stamped with safety slogans, and in all large yards, stations and shops, where possible, large illuminated signs were erected. Churches, schools, Y. M. C. A.'s, and civic and community clubs lent assistance. Safety rallies, noon-day meetings, daily divisional staff meetings were conducted at which the sole subject under consideration was "safety." Motion pictures and illustrated evening entertainments for railroad men, their families and the public were other features of the drive at the larger railroad centers.

Each railroad was directed to establish a general safety committee. The committees mapped out in skeleton form a program of activity. No restrictions were placed on any committee as to how best to secure a perfect record for the period of the "drive."

Thermoid's Safety Inspector

THE Thermoid Rubber Company, Trenton, N. J., has appointed R. C. Vandenbergh safety inspector, to succeed F. C. Birkholtz, who has been assigned to other duties. Mr. Vandenbergh is familiar with safety work, having been assistant safety inspector under Mr. Birkholtz.

Death of Edwin O. Sachs of London

EDWIN O. SACHS, founder of the British Fire Prevention Committee, the first organization to establish fire prevention methods based on scientific and engineering principles, died on September 9 at his home in England. By his death SAFETY ENGINEERING loses an old friend and, in past years, a frequent contributor.

Mr. Sachs lived to see the fire prevention movement spread through the civilized world. It was his intention to be present at the National Fire Protection

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Association meeting in Chicago next May, and the regret will be quite general in this country that he was not destined to be an honored and distinguished guest on that occasion.

University's Course in Safety

THE National Safety Council and the University of Cincinnati have established a cooperation to maintain an "industrial medicine division" at the university for medical students and graduate physicians, who will receive special training not only in industrial medicine, but also in industrial relations, including sanitation and all the fundamentals of safety work as well. The school, already under way, is unusual in many respects, chief among which are the following:

1. The student physicians alternately spend part of their time in school and part in the field among the industries of Cincinnati, Dayton and other Ohio cities.
2. The enterprise is being financed by the industrial leaders of Cincinnati and its vicinity, $40,000 annually for 5 years.
3. In addition to the regular courses, special courses are given in the medical, industrial and safety problems arising from the coming of women in industry, public health and hospital management.
4. The facilities include an industrial research laboratory where physical conditions menacing the health of employes arising in industry will be brought up for investigation and solution.

Endowment of the Mass. Tech.

THE Endowment Fund Campaign of the Massachusetts Institute of Technology is making headway. On October 22 more than $1,500,000 had been subscribed. If subscriptions amount to $3,000,000, received from alumni and friends before January 1, 1920, a "mysterious Mr. Smith" will contribute an additional $4,000,000.

Every branch of the engineering fraternity is indebted to the Massachusetts Institute of Technology, whose graduates are found in large numbers in every engineering society. Distinguished safety engineers received their early education in that famous institution, and the cause of safety engineering will be helped by an increase in the facilities of the institute, for which purpose the campaign to increase its endowment is intended.

Accident Causes in Canada

THE Ontario Safety League and the Canadian National Safety League, of which it is a member, are doing excellent service in accident prevention. Among 1,222 fatalities in Canada in 1918 due to accidents, 722 deaths resulted from four causes, namely: 194 persons were run over or caught between cars; 130 were killed by explosives; 187 were killed by falls; 211 were struck by falling objects

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Kansas City Safety Council

THE Kansas City local council of the National Safety Council has been reorganized and J. L. Smyth has been employed to serve as full-time secretary. The new organization is known as the Kansas City Division of the National Safety Council.

Freezing of Fire Apparatus

THE Factory Insurance Association of Hartford has issued this year an unusually lengthy and precise list of precautions that should be taken by manufacturers to prevent the freezing of fire apparatus. Among other suggestions is this one, timely now:

Obtain the largest possible stock of coal as early as possible. Set aside enough to warm the plant for at least 2 or 3 weeks and hold this for emergency use even should it become necessary to suspend operation of the plant for lack of coal. Such a reserve is one of the best forms of insurance against damage to or entire loss of property by fire Coal should be stored by approved methods outside buildings if possible. Some plants which were unable last winter to obtain the necessary quantity of coal succeeded in tiding over the emergency by having recourse to cordwood.

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"The Man on the Job"

The Morale of Safety—Interesting the Men in the Prevention of Accident, Teaching the "Safety Habits"

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 408 THE SAFETY ENGINEER'S WIDE RANGE OF DUTIES.—To be a successful safety engineer, it is necessary to cover a multitude of efforts. Neglecting entirely the mechanical element of accident prevention, we have chiefly a human element to deal with, and I really believe that were we thoroughly to educate the average workman in safety practices, we should feel safer than if we had no education and plenty of mechanical guards.

The safety work in our plant has been going on, of course, for some time, but we did not have a thorough, substantial organization until about 3 years ago. Lately, the statistics which I have kept during these 3 years show a reduction of 73 per cent in accidents, from the start. I have safeguarded all machinery where possible and practical.

Overhead belts are protected with wide, under-slug boards suspended on channel irons turned up at the receiving and delivering ends of the belt. All vertical transmissions are entirely enclosed with wire fabric, from the floor to a height of 7 feet. All tumbling barrels are entirely enveloped in substantial metal fabric. Wheelbarrows are equipped with hand guards. All wood-working machinery is furnished with the most modern devices that can be found. The start and landings of all stairways are placarded with precautionary signs and supplied with anti-slip treads, wherever possible. All flywheels on portable motors, that are being run in and tested out, are enclosed with a portable half circular metal guard. All areas where mechanics are forced to stand while performing hazardous operations are supplied with rubber mats, to prevent slipping and stumbling. All freight elevators are equipped with warning signs and full automatic gates and safety tread, each car having an individual operator. In departments where overhead and traveling cranes are in use clear gangways below are provided for the conveying of overhead traffic, and gongs warn all operators to step from the path of any moving load overhead. All cranes, lifts and hoists and their respective cables are inspected every month by an expert on wire rope, a systematic schedule being reported and kept, from which all cable dead-ends are thoroughly inspected and checked. Four hundred and eighty-seven items of safety equipment used on various machines throughout the plant are examined and inspected once a month, and systematically tabulated and checked. All electric switchboards are entirely enclosed on 4 sides and top with expanded metal and locked, thus preventing access except by the chief electrician and myself. Each department is now being supplied on the outside of the buildings with disconnecting switches, which can be pulled by anyone in case of fire. Eighty per cent of the individual switches throughout the plant are of the latest type, it being impossible for an operator to come in contact with charged metal. All electric cabinets are supplied with the latest boxes, making it impossible for operators to come in contact with charged metal while changing fuses. All hand tools are inspected weekly, and broken and split handles, as well as mushroomed tools, are discarded, and the wearing of goggles is rigidly enforced. So much for the mechanical end of the game, but I really believe the most good comes from education.

There are great possibilities in the bulletin board—boards about 6 feet long and 5 feet high, placed in such a location

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as will make it easy for the operators to pass by in going to and from their places of employment. The boards should be located in places where there is much room, allowing operators to stand 3 and 4 deep, if necessary, to read the boards. Sometimes it does well to change the method of presenting the bulletins, such as one at a time or in nests of 2 and 3. I often leave the boards blank for a day or two and follow this up with the posting of one large bulletin, right in the center. The boards, of course, are printed black with white trimming, and the universal "safety" sign in white and green should be at the top in the center. Whenever it is possible I have a photograph taken of actual accidents that have happened in our plant and display these on the boards. These posters never fall short of their intent. When an operator is originally employed, he is given a pamphlet of instructions, embodying safety suggestions and rules, worded in such a way as will appeal to his judgment, rather than in the form of a command.

The safety engineer should possess a personality which will admit of his personal association with all employes, and he should mingle among them as often as possible. He should be ready at all times to listen to suggestions, shop gossip and petty quarrels, as it has been truly said, "The careful man is least likely to be hurt."

The safety engineer must be capable of responding to a wide range of duties. He must jump suddenly from an executive consultation to a conversation with a workman operating a lifting magnet, in which he urges the more frequent use of the warning bell. While studying out the problem of eliminating horse-play in any department, he is called upon to eliminate the stuffy condition in another department where there are many female employes. He is also expected to decide whether the case of hernia originated by reason of a working operation about the plant or whether it was being carried by the man before he was employed. Immediately upon leaving the manager's office, where he received a reprimand for the cost of safety equipment, he goes back to his office only to find that the consulting engineer has had his leg broken in 4 places by a flatter discharged from a large steam hammer. He must preside at monthly safety meetings, and must arrange and gauge his conversation in such a way as will elicit the most and best information from his sub-committeemen. As a response to safety suggestion boxes and requests for safety suggestions from the employes as a whole, he finds much helpful information, but he also finds much that is useless, among which are some suggestions from responsible officials, and he must be very careful how these suggestions are treated. It often happens that much progress that has been made is discounted by the rejection of suggestions thrown into the waste paper basket.

The safety engineer must not be a "long hair," neither must he be "hard boiled," but he must bide his time and wait for beneficial results to occur, and then he should not fail to force home his arguments on the management. I have often heard it expressed as "selling safety to the boss." I think if statistics are kept from time to time, it can be shown that "safety" is being "presented to the boss," and I have no doubt that before long they will all see it that way. Of course, with some of us it would probably be worth our job if we were to tell the boss he is "required to do" this or to do that, but by first studying what we want to do and then studying the boss, I rather think that we can "put over" almost anything within reason.

One important point, I find, is that the safety engineer must, if possible, supply himself with the eyes and mind of the average workman, and must be careful not to put over any theoretical stunts that will cause any ridicule, and especially must he see to it that all new ideas and suggestions work out satisfactorily, thereby preventing himself from becoming a laughing-stock.

After 8 months of successful association among the men, it becomes a subject of conversation among the men that Mr. So-and-So is a "good fellow" and that "That 'Safety First' chap is a friend of ours, even though he does wear a boiled shirt," and after a couple of years when you are able to show a chart with a re-

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duction of 73 per cent, you will hear such remarks as, "There goes the man who put 'safe' in 'safety.' Come to think of it, we haven't had a serious accident in our department now for 8 months . . . . ," and another remark like this, "The boss told me this morning that the safety engineer discovered a dead-end cable fastening on the big crane that was holding by one strand . . . might have been a serious accident," etc., etc.

So, as a suggestion, I would advise my fellow safety engineers to go out among the men as much as possible, not only during working hours, but after working hours, during the noon hours, and before work. Talk to them about their daily work, their wives, their children, ball games, movies, church, dances, picnics—in fact, be a "hail fellow well met" minus, of course, the booze, and it will surprise you to see how much more attention you'll get out of the boss than you would ordinarily.

As has been truly stated by another, "The assets of a business seldom receive recognition on any other basis than that of money." We may consider "Safety First" in terms of dollars and cents as far as we can, so in conclusion I respectfully call your attention to the following, in the form of a copy of a letter received from the State Compensation Insurance Fund of California, showing the dollars and cents side of this safety business. I personally have probably been more fortunate than my fellow safety engineers in that I have been able to show this advantage. That, in addition to the humanitarian showing, is certainly gratifying, not only to myself but to my superiors:

State of California
State Compensation Insurance Fund
May 27, 1919.

Dear Sir: This letter is to advise you of the result of a re-rating of your risk by the California Inspection Rating Bureau. We are pleased to advise that you have been allowed the maximum credit of 10 per cent under the subject of Safety Organization, Inspection and Education. It is impossible to receive more credit under this subject, and it is now in order for you to maintain the good work carried on by this organization in order that the credit will not be discontinued at any time.

Under the subject of First Aid and Hospital you are receiving the maximum credit of 2 per cent. This credit is allowed because you have a trained nurse at your plant at all times, and also the services of a registered physician.

Under various other subjects, and owing to the favorable physical conditions existing in your premises through the safeguarding work done by your committee members, you have been allowed an additional credit of 9.8 per cent, making a total of 21.8 per cent reduction in all merit ratable insurance rates.

We also beg to advise that this favorable reduction in all merit ratable classifications goes back to the inception date of the policy now in force.

In order to give you some idea of what this saving means in dollars and cents, we have to advise that the bureau in making this rating used an approximate estimated annual payroll of $1,762,200. This payroll segregated under various classifications develops a premium of $45,200 annually, when manual rates are applied. The work carried on by your safety organization has resulted in a saving of 21.8 per cent of this premium, or an annual saving of $9,853.60, or reducing the annual premium under merit ratable classifications from $45,200 annually to $35,347.40.

In addition to the above, we beg to advise that owing to the fact that the —— Manufacturing Company is carrying on an efficient safety organization, the accident experience should be most favorable with the result that they will participate, to a greater extent, in the profits which are refunded to our insured at the end of each year, than if the experience were not so favorable.

In addition to this financial saving, you have, of course, prevented many serious accidents through the careful work done by your safety organization.

The safety organization of the —— Manufacturing Company is certainly to be congratulated for receiving so favorable a credit in rate reduction, and we believe all members of the organization, as well as yourself, will be interested in knowing what has been accomplished.

Should there be anything further that you desire to know in connection with the re-rating of your risk, please do not hesitate to address us in connection with the same.

Yours very truly,
STATE COMPENSATION INSURANCE FUND,
By E. F. GOELZER, Supt., Inspection & Safety Dept.

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No. 409 ALL INDUSTRIES—THE HUMAN ELEMENT.—Wherever we go we find that all human beings are alike. The human mind is so constantly occupied with things pertaining to details of business, pleasure or the problems of life.

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to the exclusion of all immediate surroundings, that something is needed to awaken that mind to a realization of what might happen to bring discomfort or actual suffering to themselves or families, through certain acts of commission or omission. In other words, in some way we must put forth a constant reminder, to act as a check, and cause the human individual to think first of personal safety.

Then we have that trait, which is so characteristic in all Americans, of "taking a chance" or gambling. The only difference between a man who will bet on a horse race and one who will take a chance of crossing the street or driving his automobile over a railroad crossing, without first stopping to see what is coming, is the stakes. They are both gamblers. The first bets a certain horse will win the race, and the stakes are a few dollars; while the other takes a chance that he will get across before something happens along, and the stakes are his life, and perhaps the lives of others, against a few minutes of time.

Men and women become so accustomed to their surroundings that often practices involving risk of injury are followed automatically or, what is worse, unthinkingly.

The human element cannot be effaced by mechanical devices. The education of employes through meetings (with illustrated lectures wherever possible), foremen's meetings, safety committees composed wholly of workingmen, by stimulating friendly departmental rivalry, bulletin boards, and general safety promulgation have accomplished much in curtailing accidents.

Prizes for September Articles

First Prize. No. 405. Ralph I. Coombs, Safety Inspector Travelers Insurance Co., 11th Floor, Park Bldg., Worcester, Mass.

Second Prize. A tie. No. 406. Neal Grant, Baltimore Copper Smelting & Rolling Co., Casting House St., Baltimore, Md. No. 407. F. W. Hart, Dept. of Accident Prevention and Sanitation, B. F. Goodrich Co., Akron, Ohio.

Comments by Members of the Committee

My reasons for selecting Article 405 as the best of the three articles are that the writer in choosing his subject, "Perseverance," selected a word which denotes an attribute without which safety engineers usually avail little. He brings out very clearly the necessity of forming and amplifying the safety habit. His allusion to plant officials lending their support to all organized safety activity is worthy of much commendation.

It would be well if education of this nature found more welcome by contractors engaged in constructing reinforced concrete buildings and bridges. When it does, I am sure the accident frequency in their operations will decrease materially.

❦ ❦ ❦

My selection, first prize, is 407; second prize 405. I beg to express my views by commenting in a manner to permit THE NAIL to do some talking, viz.:

> THE NAIL: They throweth me in the paths of men; they anointeth me with rust. I am the viper of the careless, thoughtless blockhead. I claim thousands of innocent victims every year. I am mightier than the sword, for I lurk in unseen places and do most of my work silently.
>
> God hath made man and all things visible and invisible and to you He gave eyes to see, ears to hear and a tongue to speak and brains to think. Also, His only Son for the preservation of humanity.
>
> When thou throwest me in the paths of men thou dost not think, thou dost not care, and thou weakenest thy moral obligation to men.
>
> If it were an eye for an eye, a tooth for a tooth, thou wouldst think of me, for whosoever throweth me about carelessly is truly a careless, dangerous man and not worthy of his hire.
>
> Listen, O Blockhead, and beware! To-

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morrow the crape may be on your own door Who knows? The best safety device is a careful man. I was made to construct, not to destroy.

The foregoing may be allegorical. However, Article 407 appeals to me as striking the nail on the head. I may be over-prejudiced or over-sensitive relative to the up-turned nail, as I have been the victim many times myself. The sight of an up-turned nail makes the chills run over me. This article appeals to me so strongly that, from my viewpoint which I have tried to express in the remarks by "The Nail," the man who will carelessly throw around a board with a projecting nail in it is a careless man in every respect and not worthy of his hire—one who has no regard for his brothers' safety.

Our judgment of the three articles published in the September issue gives the verdict to Article 407, the writer of which, we believe, has come closer to getting his message across to those who need it most, both because of the subject and the method of attack he has used. We believe, however, that all three articles are extremely good and show a very good knowledge of the subjects upon which they have been written.

Some time ago, the question of placing foremen on this committee of judges was brought to our attention. It seems to us to be an excellent idea, in that it will create an interest in the work of accident prevention among the foremen, who will re-act by their giving much closer supervision. It will also give the plant inspector and engineer one more agent to use in driving home the old, old story of "Safety First."

All the September articles are good, each one giving out something constructive. I cast my vote for 406, as the author brings out the point of sociability in safety work. Sociability is one of the necessary function in any endeavor, but especially in safety work.

There is no doubt that men should be graded as to their ability to perform a given task.

A member of the committee writes: "Personally I enjoy reading your many subjects, each number, and have gained some very practical working points, which one must know in keeping up with 'Safety First.' Any one engaged in safety work should certainly be on your mailing list. The writer will gladly lend his offices in furthering the success of your publication and from time to time will try to write articles of interest. Here's hoping all of your many readers will speak their ideas through SAFETY ENGINEERING."

Dust Explosions in Canada

IN the greatest of all dust explosion accidents, that in the Candian Government grain elevator at Port Colborne, Ontario, on August 9 last, the verdict of the coroner's jury was "Nobody to blame." The fact remains, however, that there was a loss of 10 lives and about $2,000,000 in property. How to prevent a repetition of such losses is the question. Canada is at work on the problem. A commission of experts visited the scene and gathered all information available. Another step was the holding of a conference of parties west of the Great Lakes interested in the grain trade. This conference was held in Winnipeg on November 24. There were representatives of the United Grain Growers, the great organization of western Canada farmers, the Winnipeg Grain Exchange, the Calgary Grain Exchange and other similar bodies. Altogether from 800 to 1,000 men expected to assemble to take counsel on this momentous question. The grain trade is the most important single industry in Canada, and it may be said to be the very life of the vast prairie country which of late years has attracted farmers from all over the world and rewarded many of them in princely style.

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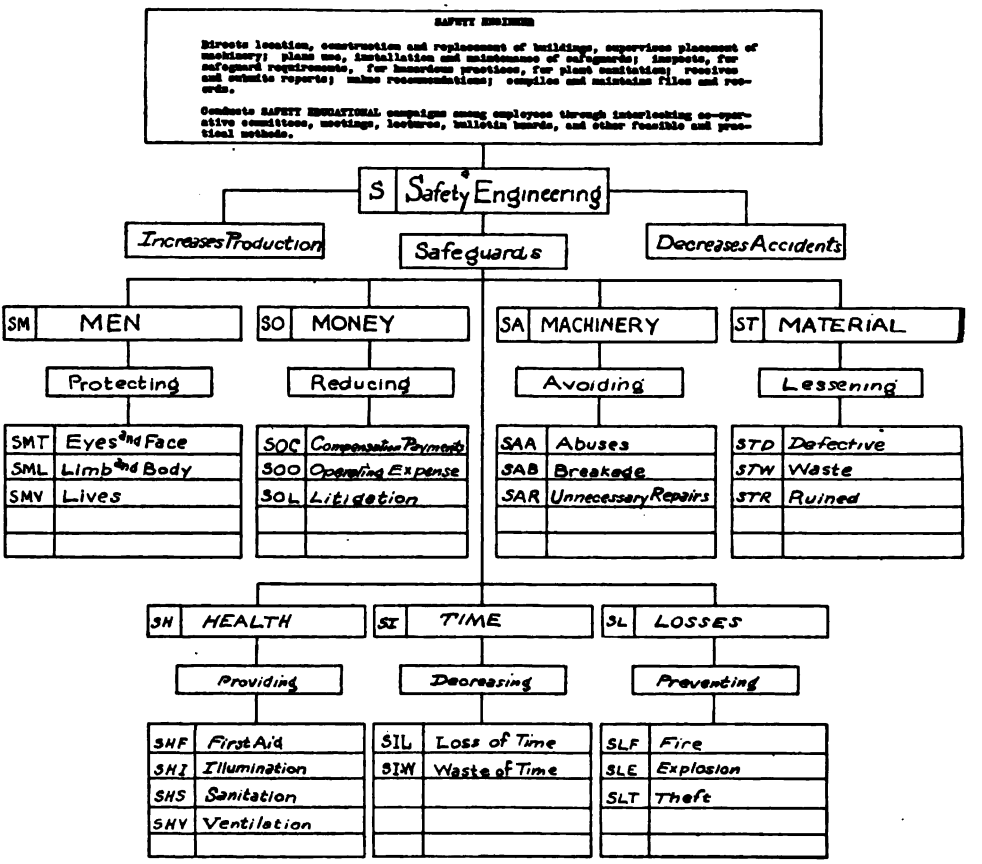
Safety Engineer's Functional Chart



THIS chart, drawn by Thomas P. Scully, late captain, U. S. A., and assistant administrative officer of the Motor Transport Corps, shows the results that may be gained by a proper safety supervision. During the war Captain Scully was charged with the responsibility of functioning the many divisions of the Motor Transport Corps and by his charts the operation of that corps was greatly facilitated and enormous savings were effected for the Government.

Mr. Scully is now associated with Strong, Kennard & Nutt and his knowledge of the safety field, combined with his experience in functioning for the army, makes his exposition of the duties of a safety engineer of special value and interest.

The analysis of the wide influence and divergent efforts of a safety engineer as outlined in Mr. Scully's chart is, we think, suggestive and helpful and we hope that the publication of it by SAFETY ENGINEERING will be a step towards the definite fixing of a safety engineer's position. We do not think that even Mr. Scully believes that the chart in its present form represents the final outline of a safety engineer's functions but it certainly goes further towards determining them than anything published hitherto.

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American Society of Safety Engineers

AT the regular meeting of the society on the evening of September 20 the second reading of the new constitution and by-laws was given and the ballot nominated by the committee appointed by President Van Horne on September 12 was canvassed.

The meeting was held in the United Engineering Societies' building, New York, and was well attended. It was called to order by President Van Horne, who gave a brief resume of the acts of the society since the appointment of the reorganization committee last June and announced that a total of 76 applications for membership had been received in the past few weeks.

Messrs. Earle, Pedroncelli and Haggerty were appointed tellers of election, and while they were canvassing the vote Mr. Mowery, as chairman of the reorganization committee, read the constitution, first in its entirety and then section by section, so that action might be taken on it seriatim. There were few changes in the constitution as submitted. The qualifications for membership provoked considerable discussion and it was decided to have them submitted back to the executive board for further consideration. The tellers then advised the chair that the nominees of the committee were elected practically unanimously, the new officers being:

President—H. Weaver Mowery, 50 Church st., New York City; safety engineer, American Abrasive Metals Company.

Vice President (One Year)—G. E. Sanford, West Lynn, Mass.; safety expert and general safety inspector, General Electric Company, all plants in United States.

Vice-President (Two Years)—Chester C. Rausch, 18 West 24th st., New York City; safety engineer, technical director, Safety Institute of America.

Treasurer—James G. Shaw, 30 East 42nd st., New York City; safety engineer, supervising inspector, Travelers Insurance Company.

For Directors (One Year)—W. L. Fursman, Elmira, N. Y.; safety engineer, supervising Willys-Morrow, Willys-Overland and other Willys plants. George M. Douglas, Perth Amboy, N. J.; safety engineer, supervising all plants, American Smelting & Refining Company. F. V. Clark, 80 Maiden Lane, New York City; manager, SAFETY ENGINEERING. H. G. Wieberg, 135 William st., New York City; safety engineer, Chief Inspector, Compensation Inspection Rating Board.

For Directors (Two Years)—Thomas A. Walsh, Harriman, Pa.; safety engineer, Merchants Shipbuilding Corporation. Frank Scott, 17 Cedar st., New York City; safety engineer, supt. of inspections, Hamlin & Co., for United States Rubber Company, National Lead Company, Consolidated Gas Company of New York, New York Edison Company of New York. George Oliver Smith, 60 Wall st., New York City; safety engineer, supervisor all plants, H. L. Doherty Company. Albert S. Regula, 30 East 42nd st., New York City; safety engineer, District S. E., Liberty Mutual Insurance Company.

For Directors (Three Years)—A. D. Risteen, Hartford, Conn., safety engineer, director Technical Research. Travelers Insurance Company. C. E. Pettibone, Cleveland, safety engineer, Pickands, Mathes Co. Holger Jensen, Baltimore, Md., manager Inspection and Rating, Maryland Casualty Company. George T. Fonda, Bethlehem, Pa.; safety engineer, General Supervisor Employment Compensation & Welfare, Bethlehem Steel Company.

H. WEAVER MOWERY,
President, American Society of Safety Engineers

The retiring president, Mr. Van Horne, having declared the foregoing officers elected, called the new president, Mr. Mowery, to the chair and surrendered the gavel in a graceful speech, assuring Mr. Mowery of the appreciation of the society for the work of reorganization he had so successfully planned and effected.

After a brief address, in which he outlined the manner in which the society would function so as to promote the objects which it had set for itself, and without conflicting with the existing agencies but along lines which had been thus far neglected, President Mowery announced that the society now would welcome the submission of technical safety engineering problems for consideration and determination and invitations to cooperate in the formulation of codes.

John A. Dickinson, associate mechanical engineer of the Bureau of Standards, Washington, stated that he carried from Dr. Rosa an expression of hope that the society would

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co-operate with the National Bureau of Standards in its work and solicited the immediate appointment of committees to work with it and the A. S. M. E. in formulating the new codes on elevator safety, head and eye protection and woodworking machinery It was decided to appoint for this purpose three sub-committees of technical experts in the several lines, and the president requested the suggestions of names of men whose association and counsel would be valuable to the Government and the industry.

The president announced that, as it was a fundamental to know just what activities should be the duty of a safety engineer and for which he should be qualified, C. C. Rausch, the technical director of the Safety Institute, would present a paper on that subject at the next meeting. It was requested that all interested in the subject should write fully their views of it and mail them to the society, to be considered in connection with the discussion to follow the presentation of the paper by Mr. Rausch. This is the beginning of a systematic effort to define and elevate the status of the safety engineering profession and prepare the way for including a course of safety engineering in technical institutions.

October Meeting

The regular meeting of the society was held in the rooms of the American Society of Mechanical Engineers on Friday evening, October 17. Nearly 40 members were present. Preceding the meeting the executive board met and transacted considerable business of importance to the society. George W. Cravens, consulting engineer, Westfield, N. J., was made permanent executive secretary.

President H. W. Mowery opened the regular meeting with a report of the Cleveland meeting of the National Safety Council, showing what good work it is doing and how much benefit will result from a close co-operation between that organization, the Safety Institute of America and the American Society of Safety Engineers. Each of these has its own field, but each is necessary to the other in order to insure the very quickest and lasting results from the safety movement. It is evident that the three organizations will work together for the best interests of all concerned.

It was planned to have a paper at this meeting by Chester C. Rausch, technical director of the Safety Institute of America, on the subject "The Safety Engineer," but at the last minute he was kept away by sudden illness. His paper will be presented at a later date, probably at the November meeting, and is being anticipated with a great deal of interest.

In the absence of the expected speaker it was decided to conduct an open discussion on the general subject of "The Safety Engineer," in order to bring out the ideas of the members as to what would be a good definition and how the interests of the profession as a whole might be advanced. In order to start the discussion, President Mowery read extracts from a pamphlet issued by the National Safety Council entitled "Qualifications of a Safety Engineer, His Duties and Opportunities." This showed that, in addition to a knowledge of safety in general, an engineer must possess most of the other qualifications essential to success, and especially the ability to handle men. His duties cover not only the education of those who are connected with his business, but also a supervision of new buildings and equipment to see that no radically unsafe practices are adopted. His opportunities are almost unlimited, and include industrial relations in general as well as safety to life and property.

In the general discussion which followed, Mr. Scott said he thought that the hospital and welfare work properly belonged under the general supervision of the safety engineer, but that in large plants he was usually too busy to do much outside of the strictly mechanical duties of his office.

Mr. Mowery stated that it was his understanding that the Goodrich Rubber Company bought all new apparatus and made all changes in buildings and operating plans under the direction of its safety engineer, and he cited the case of one building he knew of which had pockets of considerable size around the foundations of the columns where water could accumulate and cause trouble. Inspection by a good safety engineer would have prevented that.

Mr. Fonda said his experience showed that the duties of the safety engineer depended upon circumstances. He called attention to the fact that, whereas the engineer acted as an inspector in large shops, it usually fell to the lot of the master mechanic or superintendent in smaller shops to do such safety work as was done. In most shops the safety engineer has numerous and miscellaneous duties to perform, and the medical work is generally separate and under the direction of a doctor. He also brought out the difference between a safety engineer and one who was merely a safety inspector, by showing that the engineer had a very broad duty to perform.

Mr. Mowery drew the parallel with engineers in other lines and showed the effect of safety provisions on production. He asked for opinions on what attitude colleges should take on the matter of safety, and suggested that colleges might some day offer the degree of "Safety Engineer," similar to their present degrees in other lines. Messrs. Fonda, Scott, Sanford, Cravens, Robinson, Strickland and others took part in that phase of the discussion and brought out many good points. Among others were the views that engineers should be taught to think in terms of safety; colleges should equip their laboratories with safety devices and see that students realized their value; fire protection should be taught along with other safety

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measures, and a definite campaign of education should be started to show the schools and colleges the value of getting the right point of view on safety matters in general.

The possibility of having a "Safety Week" in small towns as a means of interesting the public was suggested, and the use of motion pictures in schools, theaters and public places was also mentioned as worthy of consideration.

During the short business meeting which followed the discussion, Mr. Fonda made the motion that a committee of three be appointed to co-operate with the National Safety Council's committee on education. Carried.

After a discussion of the question of dues and initiation fees it was decided to bring the matter up for final action at the next meeting. The general feeling was that the dues should remain at the present amounts, but that members living in the Metropolitan district should pay an additional $2 a year because of the extra advantages they possess over the members living outside of New York. It was decided that the equivalent of a local section should be formed, similar to the practice followed by other engineering societies.

It was suggested that an endowment fund could be established if some of the large corporations and wealthy members could be interested in the enlargement of the society. The secretary was instructed to look into the matter.

There being no objection, it was decided to have the fiscal year end December 31, thereby agreeing with the calendar year and simplifying the records covering dues.

The meeting adjourned until the third Friday in November.

ENGINEERING SECTION OF THE NATIONAL SAFETY COUNCIL

In accordance with the action of the annual meeting of the National Safety Council on October 1, the executive committee of the Council has approved the organization of an engineering section along the lines described below:

This plan does not contemplate a Safety Engineering Section, nor does it attempt to define the term safety engineer, which has been commonly applied to all men in responsible charge of safety work. The purpose of the new section is to bring together in closer contact the civil, mechanical, electrical, mining and chemical engineers in the Council's membership, so that they may contribute more effectively toward the solution of the purely engineering problems so frequently encountered in safety work, just as the physicians among our membership are united in the Health Section.

Membership qualifications are parallel to those of the great national engineering societies; persons applying for membership in the Engineering Section must either be members of one of these societies or must have had at least 10 years' experience in engineering work, including at least 5 years in responsible charge, a college degree being considered equivalent to 2 years' experience. For associate membership, without the right to vote or hold office in this section, there is required at the present only 3 years' experience; this will gradually be increased to 6 years, which is the requirement of those engineering societies having the highest standard of membership.

The details of the plan approved by the executive committee, on the recommendation of a special committee of engineers, are as follows:

MEMBERSHIP

The membership of the Engineering Section shall be composed of individuals who are members of the National Safety Council, or who are employed by or affiliated with members of the Council, and who, in addition, have the following qualifications: Either (1) they must be members of the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Chemical Engineers, or Canadian or European societies of equal standing; or (2) they shall have had at least 10 years' experience in engineering work and shall have been for at least 5 years in responsible charge of such work, a degree from a recognized college of engineering being accepted as equivalent to 2 years' experience. Persons who are members of the Council, or employed by or affiliated with members of the Council may become associate members of the Engineering Section if they are either (1) associate members of the American Society of Civil Engineers or the other engineering societies above mentioned, or (2) if they have had 3 years' experience in engineering work, a college degree being given the same credit as above. Such associate members shall have all the rights and privileges of members except the right to vote or hold office in the Section.

ORGANIZATION

The Section shall have a chairman, a vice-chairman, and a secretary, the secretary being a member of the engineering staff of the National Safety Council; and an executive committee of not more than 25, including the officers, and including at least one member representing each of the industrial sections of the Council. Among the sub committees of the executive committee there shall be a committee on membership, with 5 members, which shall pass upon all applications for membership in the Section. Messrs. D. S. Beyer, J. R. Brownell, A. P. Costigane, L. A. De Blois, G. T. Fonda, H. W. Forster, E. B. Morgan, L. R. Palmer, C. E. Pettibone, C. C. Rausch, H. A. Schultz, F. P. Sinn, T. S. Stanion, C. M. Talbert, B. F. Tillison, C. P. Tolman, E. B. Tolsted and S. J. Williams are constituted a temporary executive committee to perfect the organization of the Section.

FUNCTIONS

The functions of the Engineering Section shall be:

(1) To help to meet the technical demands of the various industrial sections and furnish them technical information as desired.

(2) To perform technical services for the Council, on request of the executive committee of the Council, such as the development of standards or participation therein; the solution, by industry or through research, of special engineering problems arising in safety work; and helpful co-operation with the American Engineering Standards Committee, the National Engineering Societies, the Bureau of Standards, the casualty department of Underwriters' Laboratories, etc.

(3) To conduct one or more meetings as a part of the Annual Safety Congress, at which engineering problems shall be discussed.

(4) To conduct, if considered desirable, one or more additional Sectional meetings during the year, or in different localities.

(5) To carry such other activties as will, in the opinion of the executive committee of the National Safety Council, promote the safety movement and the best interests of the Council.

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(*Continued from page* 195)

made at the time of employment, after that every employe was a member of the family and entitled to equal treatment.

Fear was felt that, if no term of service was made a condition of eligibility as a representative, a radical element might secure control, but the men have taken care of that point; the actual length of time that the representatives have been in the employ of the company averages 7 years, long enough to secure what the company desired—an understanding of the company's policies and aims.

In explanation of the company's recent "strike" it was explained that the cessation of work was for the purpose of avoiding conflict with strikers in neighboring plants, that there had been a full understanding between employes and management.

Additional experiences along the line of industrial democracy were related in the papers of F. L. Feuerbach and E. B. Tolsted, while labor's side of the question was presented by Fred Schultz, vice president of the Cleveland Federation of Labor, who read a paper by Matthew Woll of the American Federation of Labor in defense of unionism.

The neutral viewpoint was expressed by William M. Leiserson, impartial chairman of the Labor Adjustment Board for the Clothing Industry of Rochester. The keystone of his argument was that collective bargaining was the essence of democracy, and, whether it is private or public industry, democratic control can be secured only by employes dealing collectively with executives.

Both Mr. McCormick and Mr. Leiserson were asked many questions, and the discussion was at its height when adjournment had to be taken.

THE GENERAL ROUND TABLE

Delegates were told that if they could not get up by 8 a. m. on Thursday, October 2, they should stay up so as not to miss the old fashioned free-for-all Round Table. The value of the discussion it brought forth justified the loss of a morning's sleep.

Thomas Stanion was in the chair, and Mr. Price introduced him for fear he would miss the honor, which is proverbially withheld from a prophet in his own country. Mr. Stanion explained that the Round Table would discuss the comparative value of engineering revision, supervision, and education in promoting safety.

Dr. Lucian W. Chaney of the United States Bureau of Labor Statistics spoke first for engineering revision. He said that, while education seemed to reduce the frequency of minor accidents, it did not affect the more serious ones; that often when the frequency was reduced the severity showed an increase, and that the reduction in severity was always due to engineering revision. Dr. Chaney instanced the old style blast furnace, which used to burst out with great destruction of life. No amount of education could strengthen the sides of the furnace, but engineering revision did. He asserted that the evangelistic type of education goes by the mark, and that education should be directed to increase of skill. Moreover, improper emphasis on carelessness irritated the worker and was resented by him.

L. A. DeBlois of E. I. du Pont de Nemours & Co. advocated supervision. He recognized the value of engineering revision as applied to heat and light, the guarding of moving parts and the correction of structural defects, but he thought all useless without constant supervision to see that the revised conditions are maintained.

Mr. DeBlois thought that the fixing of responsibility was important. The foreman has been the center of attack by the safety man, and, as they were in direct control, perhaps one-half of the responsibility should rest on them, but the management was certainly responsible for the foreman, and this responsibility could not be shifted.

Dr. Chaney, in reply to Mr. DeBlois, said that he believed fully in super-

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vision, but declining frequency with rising severity continues to exist.

Mr. DeBlois did not like safety committees, thinking that they caused other workmen to feel less responsibility.

Arthur H. Young of the International Harvester Company thought that the period for propaganda had passed. He expressed himself as strong for engineering revision and the adoption of safety standards.

On the matter of standards Mr. Chapin of the Pennsylvania Railroad pointed out that his road ran in 13 States, and that it had to try to comply with 13 State standards, some of which were in absolute conflict.

A. T. Morey of the Commonwealth Steel Company conceded that safety engineers are an important factor in safety work and would continue so. He favored safety committees and workmen education and was in favor of shop committees.

AMERICANIZATION

As the proportion of accidents is higher among foreign speaking employes, the Americanization of labor is a safety measure and merited a general session, which lasted an entire afternoon.

THE BALL AND RECEPTION

Getting acquainted where no introduction was necessary made the reception and dance in the evening of October 1 a decided help. The grand march was led by Mr. and Mrs. Buell W. Nutt through ingenious and intricate evolutions. Light refreshments were served, and professional entertainers were introduced between dances. It was a delightful occasion in spite of the fact that the ball room and corridors were filled to their capacity.

THE PARADE AND OTHER PUBLIC DEMONSTRATIONS

Thursday afternoon, October 2, a "mile long" parade of school boys, headed by mounted police, and fire apparatus, marched down Euclid Avenue. A number of floats were in line, the most elaborate showing the "Goddess of Safety," protecting a child from Death, which stood near in conventional costume. In line also were a number of men wearing bandages in every possible position—a gruesome but impressive spectacle. The boys carried banners with safety slogans, and 10 bands helped them to keep step.

A WELDING DEMONSTRATION

With all the spectators wearing welding goggles a demonstration of the oxy-acetylene method of welding and cutting was given in one of the foyers of the ballroom by J. Schleicher, of the Alex Milburn Company. The safe manner of attaching the tools and piping to the tanks was explained, and all possible dangers pointed out.

THE SAFETY EXPOSITION

Up and Down the Aisles in the Grays' Armory

The same green and white colors which decorated everything about town, from trolley wires to hotel lobbies, formed the decorative scheme of the exposition hall and silently preached the attainment of the safety white by the cautious green. All of the expectations raised by the reception committee, headed by Buell W. Nutt, were more than realized, and never was seen a more beautiful staging of a "safety show."

The arrangements of the booths produced a symmetry which, when combined with the lighting effects, was pleasing. Each booth was topped by two milk glass globes bearing the symbol of safety and the prevalence of potted palms and ferns heightened the art and carried along the green in the scheme.

It is impossible to mention in detail the many interesting contents of the spaces, for only a full week of constant inspection would have served for their complete study.

Entering the hall and turning to the left, the visitor received a copy of SAFETY ENGINEERING as a guide book, and then passed to the space of the Grether Fire Equipment Company, where he was surprised by the power of the electric hand searchlight and lanterns shown. An emergency exit nearby permitted Mr. Grether to do some real and effective demonstrating in a dark alley, which could

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not have provided a better testing ground.

Across the aisle was a wonderful display of Stonehouse Steel Signs, running into the hundreds and including the new railway signal sign and the new self-fastening device.

The Glauber Brass Manufacturing Company used its sanitary drinking fountains and fixtures to advantage in making an impressive display, and A. I. Fischer was kept busy explanning the safe way of "how to get a drink." The mixing valve for showers was particularly attractive.

The American Atmos Corporation showed for the first time the new models of its breathing apparatus as well as its standard types of resuscitation apparatus, pulmotors, oxygen inhalers and gas masks.

To list the things shown by Strong, Kennard & Nutt would mean a catalog. They had a demonstration of Ambrine; the guests might sit, if they chose, in surgical chairs and go through all the thrills of an operation; they might try on any goggle the market offered or dress appropriately for any sort of hard work. An interesting novelty not shown before was a legging which apparently can never be worn out, as each part is renewable and removable. Fortunately the firm has a new catalog which shows the full line.

The Consolidated Expanded Metal Companies constructed a huge cage of "Steelcrete," which gave an excellent proof of the strength and stability of their construction methods, and on the walls of the structure hung many illustrations of machine guards built of "Steelcrete."

That "pyramid of Signs," which the Safety First Supply Company promised, was the dominating feature of the exhibit, but, after all, only representative of a single line of the many which the company handles. Its new cork helmet attracted a great deal of attention, and there was a steady stream of inquiries concerning the company's surgical specialties and playground equipment.

Halsey W. Taylor entertainingly described the construction and operation of his Puritan Cantonment Drinking Fountain and quenched the thirst of visitors.

The Westinghouse Electric Manufacturing Company displayed safety devices which it is using in its own plants and which cover a wide variety of industrial operations. The company manufactures the Krantz Auto-Lock Safety Switch.

Double Absorbits formed the exhibit of the Protecto Safety Appliance Company, these being its gas masks with the double canister which provides for a reserve supply when needed.

The Aetna Life Insurance Company showed the model of the factory as described in the September issue of SAFETY ENGINEERING. It was a clever piece of work and made a convincing exhibit.

The appearance of the space of the Julius King Optical Company suggested hospitality rather than commercialism, and the comfort of visitors was provided for with easy chairs and sheltering palms; altogether an excellent atmosphere for learning head and eye protection. For the first time were shown new fiber welding helmets which are described in another column.

The "Circle T" brand marked the adjoining space, where the Trumbull Electric Manufacturing Company explained the absolute safety of its switches.

Opposite these spaces was the American-La France Fire Engine Company with as full a line of safety devices as could be found in the hall, including the 16-ounce La France Pure Air Helmet, the La France-Yablick Mask and a multitude of meritorious safety aids.

T. A. Willson & Co. had a number of novelties in goggles. Its new fiber welding goggles, with the light-excluding ventilating part, were a prominent attraction, not only in the company's booth but in several jobbers' booths as well.

How to sand a crane track effectively and how to protect the rear end of an electric car were the two features of the Nichols-Lintern display. Both were novelties to many of the visitors, the crane sander, in particular, appealing strongly to their safety sense.

Mine rescue apparatus was the feature of the exhibit of the Mine Safety Appliances Company, and the oxygen-breathing apparatus and safety mine lamps were of the greatest interest to mine representatives.

"Getting the movies at home gives the wife no excuse to go out" was what a "cop" said when he investigated the crowded aisle in front of the picture show of the Acme Motion Picture Projector Company. In addition to a "dress suit case" projector the Acme people have a great improvement in slide holders which permits of dissolving views with a single lens.

The Norton Company showed a grinder of a protective type complete with hood, which manifested careful designing and competent manufacture, also an inclined walk-way of Alundum Terrazzo Aggregates.

As the lungmotor may be used in extreme as well as in less serious cases, it was instructive to have Dr. Booher explain it from a physiological as well as a mechanical standpoint. A large assortment was shown, including a very small one for infants' use.

The Surty Guard Company had an interesting display of its cone belt shifters and saw guards, employing moving machinery.

The American Abrasive Metals Company displayed samples of Feralun, and its booth was distinguished by a handsome painting illustrating the company's statement that "Falls Are Not Jokes."

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Strauss & Buegeleisen promised an interesting exhibit, and made good. A very ingenious demonstration was given by means of a carbon arc the light of which, being the same as used in electric welding, was projected through a prism on a screen showing the spectrum. Various lenses were then introduced between the light and the screen showing the rays which were cut off. The combination of lenses used in the firm's welding goggles proved their effectiveness to all who saw them. Resistal glass was on the counter, and hammers were provided for the skeptical.

The Safety Service & Supplies Company had, as one visitor expressed it, "Everything from soft soap to fencing masks." The masks, by the way, have proved very serviceable to men engaged in rivet cutting and work of that sort where flying steel is certain.

A great exhaust head dominated the space of the Cleveland Blow Pipe & Manufacturing Company, and a fan was running to show the operation of it. A number of smaller outfits for individual grinders were shown; also a model shower bath to comply with the laws which make shower baths compulsory in foundries.

The Pneumatic Safety Tool Company showed the Safair-Tools in operation, and, from the way they fitted the hand and their beautiful workmanship, they made many friends.

Walter Soderling, Inc., displayed the Dustite respirators by using plaster casts of the human face, showng clearly the adaptability of the respirators to different shapes of faces.

Water, water everywhere and plenty to drink there was in the space of the Puro Sanitary Drinking Fountain Company. A recent change in the design of the Puro cooler makes it possible to fill a glass or a milk bottle with water in addition to the noncontaminable drinking spout.

The Howe Safety Appliance Company showed grinders circular and belt saw guards attached to the Oliver Machinery Company's machines. It also showed a number of attractive miniature models of swing saws and other types.

Many other exhibits deserve mention, but space permits only a brief survey of the outstanding features. Safety posters by school children were praiseworthy, and there were many displays of a non-commercial character, such as the clever stunts shown by W. L. Fursman of the Willys-Morrow Company—how to see Safety through a brick without X-rays—a picture-peeping machine conveying a safety message and a painting of real merit by a workman in the Elmira plant symbolizing Safety and designed for presentation to the Safety Institute of America.

The Safety Service & Enginering Company showed ladder feet, which it demonstrated most convincingly, and a punch press guard, which seemed absolutely protective; also a fine line of machine guards of perforated metal.

The Industrial Cripple

Cartoon by F. H. Babcock, Safety Agent, P. & L. E. R. R.

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Literature of Safety

Accident Prevention, Fire Prevention, Hygiene, Sanitation, Miscellaneous

EDUCATION IN ACCIDENT PREVENTION. A Treatise Showing How Accident Prevention May be Made a Part of Regular School Instruction Without the Addition of Another Subject to the Curriculum. Prepared at the request and with the approval of the National Safety Council by a member of the Council's Committee on Education. By E. George Payne, Ph.D., president of the Harris Teachers College, St. Louis, Mo. 1919. 158p. Lyons and Carnahan, Chicago.

At the annual conference of the National Education Association, Albert W. Whitney, chairman of the Committee on Education of the National Safety Council, spoke as follows: "The only way to learn is from life itself, and the schools must be approximately a working model of life. The principles of life and the facts of life can and must be got at the same time . . . What has been done in St. Louis is to use the child's knowledge and intuition of danger and safety as a part of the body of experience out of which the educational mechanism is to be made . . . In the St. Louis plan safety is not taught as an additional subject, it is not taught as a bundle of precepts, but it is made to occupy that body of experience which is used as the medium for teaching."

The National Safety Council stands sponsor to Dr. Payne's book and to his idea. That idea is to apply safety to every subject taught in the elementary grades. For each grade a definite idea is worked out. In the first grade, for example, safety is worked out in connection with the home idea, the home being the most familiar surroundings of a small child. What are safe and unsafe places to play in, safe and unsafe ways of playing, dangerous practices, etc.? In the language lessons for the same grade sentences and compositions are written about Helping Mother and Playing with Matches. In the drawing lessons the same kind of stories are illustrated. In the arithmetic class problems based upon accident statistics are given. In civics, protection to life as exemplified by the policeman and the fireman is pointed out. The idea is thus developed from grade to grade, from the home to the community, and then to industry and the bigger social problems.

In order to prevent cautiousness from becoming too great a virtue and to keep the spirit of adventure in life, the method of teaching must not be just an inculcation of a series of inhibitions. The idea of safety, to quote again from Mr. Whitney, is "a double-faced idea—safety *from* and safety *for*. . . . In every case the idea is implicitly to be completed by the addition of the thought of safety for a life or a condition that is better . . . to make the world safe *from* autocracy *for* democracy; to make the child's life safe *from* the dangers of automobile and *for* the happiness and usefulness of living."

We are glad that so important a subject—which, up to the present, if introduced into the schools at all, has been done as a novelty or fad—has at last received proper treatment and a logical place in the education of children. This book is far removed from anything faddish or periodic. It is at once profound, original and convincing. It places a problem within the grasp and understanding of every child that he may live a life of usefulness, not wastefulness; of real adventure, not foolhardiness, and of courage with understanding.

SAFEGUARDING WORKERS IN THE TANNING INDUSTRY. By Roy S. Bonsib, Chief, Division of Safety Engineering, Working Conditions Service, United States Department of Labor. Washington, 1919. 121p.

This pamphlet is a posthumous publication of the now deceased Working Conditions Service, which was established as a war bureau and went out of existence on June 30 last. The book

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gives the fundamental principles for the safeguarding of power machines, for safety organization and for hygiene, but its chief value lies in its application of safety principles to the tanning industry. This industry seems to be backward in accident prevention, as the author reports that, with the exception of three or four companies, very little has been done outside of the statutory requirements. The practices described are largely taken from approved ones, State laws, insurance requirements and those in use in the more advanced plants. In the tanning department one of the chief dangers lies in open vats and tanks. The embossing press is the most dangerous type of machine and is the cause of many amputations of hands and fingers. This machine should be properly guarded. Various methods of doing this are illustrated. Revolving drums should be protected from the projecting lugs and other projections which catch the employes' clothing, and should also be equipped with individual motors or else the belt shifter should be provided with a positive lock to prevent accidental starting of the machine. The book is fully illustrated with photographs, diagrams and specifications. Health hazards and occupational diseases found in the industry are briefly described.

THE CONDENSED CHEMICAL DICTIONARY. Compiled and Edited by the Editorial Staff of the Chemical Engineering Catalog. New York, Chemical Catalog Company, 1919. 525p.

This is a dictionary and in no sense an encyclopedia such as Thorpe's Dictionary of Applied Chemistry. It is a welcome volume, filling a much needed want. The arrangement is alphabetical under the name of the chemical or compound. The cross indexing has been done carefully and is very full. Under each name are given the synonyms, trade names, formulae, color and properties, constants, solubility, derivation, method of purification, grades, containers for storing and shipping, uses, fire hazard and railroad shipping regulations. The dictionary is confined largely to industrial and pharmaceutical chemistry, as it is intended for commercial use. The safety man and the insurance investigator will find it useful from the fact that in every instance it states whether there is a fire hazard, and, if so, what is its nature. It has been prepared by chemists familiar with the field.

FACTORY INSPECTION AND FACTORY INSPECTORS. By George M. Price, Director of the Joint Board of Sanitary Control. *Journal of Industrial Hygiene*, August, 1919, p. 165-176.

The proper enforcement of factory laws can be accomplished only by a system of proper factory inspections. Neither employer nor employe places any great confidence in the factory inspector. This leads to discontent and anarchy, makes the law seem a mockery and protective legislation a delusion and a snare. The average factory inspector is a political appointee, insecure in tenure of office, ignorant of his work and receives an inadequate salary. Factory inspection should be a career and a profession on the same scale with engineering. This has been done in England, France and Germany. Factory inspectors should not be under political jurisdiction, but under civil service; there should be a regular system of promotions; the head inspector should be appointed from the force, and adequate provisions made for old age and disability.

PROTECTIVE GARMENTS IN THE WAR GAS INDUSTRY. By H. C. Bradley, Major, Chemical Warfare Section, U. S. A. *Journal of Industrial Hygiene*, September, 1919, p. 255-8.

Protective clothing of mustard gas workers is described. All the garments devised were heavy, hot and uncomfortable, and the writer doubts whether the average workman could ever be forced to wear them. Major Bradley ascribes the low accident rate in the mustard gas plants to the fact that everyone knew the dangerous qualities of the materials used and that strict military discipline was enforced.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires such as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losses by fire and in saving lives.

BAKERIES AND CANDY FACTORIES

September 20, 1919. Youngstown, Ohio. 105 West Federal street. Bakery. One 2-story building damaged. Walls, brick. Floors, wood. Roof, wood. Cause, bake oven. Fire started under baker. Discovered by police officer at about 4 a. m. Alarm, telephone. Duration, 1½ hours. Stopped in building of origin. Value of building and contents, $40,000. Property loss, $20,000.

August 22, 1919. Bakersfield, Cal. Hochheimer & Co., and others. 19th and Chester streets. General merchandise. Two 1- and 2-story buildings destroyed and one 4-story building partially destroyed. Walls, brick. Floors, wood. Roofs, tar, gravel. Cause, unknown. Fire started in bakery, it is supposed. Discovered by man passing at about 4:45 a. m. Alarm, still. Duration, 4 hours. Stopped in Hopkins' 4-story building. Fire was favored by construction of building. Firemen handicapped by very poor water supply. Private fire apparatus, 8 hand chemicals. Three or 4 persons in Hopkins' building. Means of escape, elevator and fire escapes. Value of buildings and contents, $600,000. Porperty loss, not reported to SAFETY ENGINEERING.

CHURCHES

September 8, 1919. South Bend, Ind. Trinity Presbyterian Church. Corner of St. Peter and Colfax avenues. Two 2-story buildings damaged. Walls, brick, wood, lath, plaster. Floors, wood. Fire started on roof. Discovered by passerby at about 10:19 a. m. Alarm, street box. Duration, 30 minutes. Stopped at roof. Value of buildings and contents, $17,000. Property loss, $7,000.

COAL AND LUMBER YARDS

September 4, 1919. Grand Rapids, Mich. Marquette Lumber Company. West Fulton street and the railroad. Lumber yard. One 1½-story lumber shed destroyed. Walls, frame. Cause, believed to have been incendiary. Fire started near railroad. Discovered by passerby at about 1:47 p. m. Alarm, over signal system. Duration, 12 hours. Stopped at north end of yard. Value of building and contents, $75,000. Property loss, $43,000.

COLD STORAGE AND ICE PLANTS

August 20, 1919. Muskegon, Mich. Magoon & Kimball Company. Foot of Third street. Ice house. Two buildings, 40 feet in height, destroyed. Walls, wood. Floors, wood. Roofs, shingle. Discovered by passerby at about 8:05 p. m. Alarm, box. Duration, 6 hours. Stopped when buildings were consumed. Firemen handicapped by distance from hydrant. Value of buildings and contents, $30,000. Property loss, $20,000.

CONFLAGRATIONS

July 20, 1919. Forest Grove, Ore. Main street, North First avenue and College way. Second-hand store; hardware store; garage; real estate office. Thirteen 1- and 2-story buildings destroyed. Walls, wood; brick. Floors, wood; cement. Roofs, shingles. Cause, incendiary. Fire started in second-hand store. Discovered by passerby at about 12:38 p. m. Alarm, telephone. Duration, 14 hours. Injured, 2. Value of buildings and contents, $65,000. Property loss, not reported to SAFETY ENGINEERING.

July 23, 1919. Chicago, Ill. Mackinaw avenue, between 85th and 86th streets. Dwellings, apartments, sheds, barns. Seventeen buildings, mostly 2-stories, destroyed. Walls, frame. Floors, wood. Roofs, shingle, tar paper. Cause, boys playing with matches. Fire started in shed, rear of 8558 Mackinaw avenue. Discovered by citizen at about 5:25 p. m. Alarm, telephone. Duration, 6 hours. Stopped at 8546 Mackinaw avenue. One fireman died from effects of injuries. Value of buildings and contents, $75,000. Property loss, $50,000.

COTTON WAREHOUSES

August 22, 1919. Dallas, Tex. Trinity Products Company. Hutchings road. Cotton bleacher plant. One 1-story building and 700 bales of cotton destroyed. Walls, sheet iron. Floor, concrete. Roof, sheet iron. Cause, unknown. Fire started in middle of building. Discovered by night watchman at about 1 a. m. Alarm, telephone. Duration, 5 hours. Stopped in same building. Firemen handicapped by storage tank at plant 40 x 40 and 7 feet deep. Private fire apparatus, boiler feed hose pump. Value of building and con-

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tents, $43,400. Property loss, $38,163, estimated.

DEPARTMENT STORES

September 10, 1919. Wichita Falls, Tex. W. B. McClurkan & Co. 700-702 Ohio street. Dry goods. One 2-story building damaged. Walls, brick. Floors, wood. Roof, gravel. Cause, unknown. Fire started on deck in southwest corner. Discovered by boys at about 6:30 p. m. Alarm, telephone. Duration, about 1 hour. Stopped in building of origin. Fire was favored by construction of brick walls. Private fire apparatus, none. Value of building, $50,000; contents, $120,000. Property loss, building, $2,700; contents, $50,000.

DWELLINGS, ORDINARY, CITY

August 19, 1919. San Angelo, Tex. J. W. Westbrook. South David street and Avenue O. Residence. One 2-story building damaged. Walls, brick. Floors, wood. Roof, tile. Cause, electric wiring. Fire started in attic. Discovered at about 4 a. m. Alarm, telephone. Duration, 4 hours. Stopped in building of origin. Fire was retarded by brick walls. Firemen handicapped by lack of water and distance from pumping plant. One person in building. Value of building and contents, $60,000. Property loss, $36,000.

ELECTRIC TRACTION PROPERTIES

August 24, 1919. Rock Island, Ill. Universal Tractor Plant. 45th street and 4th avenue. Tractor works of the Moline Plow Company. One 1-story building damaged. Walls, brick. Floor, concrete and block. Roof, wood. Cause, crossed wires. Fire started on roof. Alarm, A. D. T. system. Duration, 9½ hours. Stopped at east end. Firemen handicapped by low water pressure. No further information reported to SAFETY ENGINEERING.

FLOUR AND CEREAL MILLS

September 20, 1919. Grand Rapids, Mich. Valley City Milling Company. Scribner street and G. R. & I. Railway. Flour mill and elevator. Two 5-story and 6-story buildings partially destroyed. Walls, frame. Floors, frame. Roofs, frame. Cause, believed hot box. Fire started on third floor. Discovered by night watchman at about 3:22 a. m. Alarm, box. Duration, 36 hours. Fire was favored because of old frame construction and large open areas. Firemen handicapped by start which fire had. Private fire apparatus, standpipe inside, which firemen could not use. Persons in building, 2. Value of building and contents, $225,000. Property loss, $165,000.

FOUNDRIES AND MACHINE SHOPS

September 12, 1919. Elyria, Ohio. Elyria Iron & Steel Company. Mussey avenue. Automobile bumpers. One 1-story building partially destroyed. Walls, sheet iron. Floor, dirt. Roof, wood covered with composition roofing. Cause, electric wiring. Fire started under roof. Discovered by night foreman at about 7:20 p. m. Alarm, telephone. Duration, about 30 minutes. Stopped in building of origin. Fire was favored by side walls of sheet iron on wood frame and wood roof on steel trusses. Firemen handicapped by distance of building from street and piles of tubing in yard. Private fire apparatus, 30-gallon chemical tank. Value of building and contents, $30,000. Property loss, $10,000.

August 15, 1919. Minneapolis, Minn. Eagle Foundry. University and 26th avenues. Foundry. One 1-story building destroyed. Walls, wood. Floor, dirt. Roof, rubberoid. Cause, sparks from cupola. Fire started on roof. Discovered by pedestrian at about 5:22 p. m. Alarm, telephone, street box. Stopped when building was consumed. Fire was favored by wood construction. Private fire apparatus, none. Persons in building, 10. Value of building and contents, $4,600. Property loss, $4,600.

GARAGES AND AUTO REPAIR SHOPS

September 14, 1919. St. Louis, Mo. 3906 North 25th street. Garage. Two 2-story buildings damaged. Walls, frame, Floors, wood. Roofs, composition. Cause, unknown. Discovered at about 10:05 p. m. Alarm, street box. Duration, 1 hour. Stopped at adjoining building. Fire was favored by wood construction. Private fire apparatus, none. Value of buildings and contents, $10,000. Property loss, $1,875.

MANUFACTORIES, MISCELLANEOUS

September 25, 1919. Brantford, Ont. Brantford Roofing Company. Sydenham street. Roofing manufactory. One 2-story building damaged. Walls, brick. Floors, first, cement; second, wood. Roof, Brantford roofing. Cause, water coming in contact with vats of boiling asphalt. Fire started in melting room. Discovered by employes at about 1:48 p. m. Alarm, telephone. Duration, 49 minutes. Stopped in room in which it started. Fire was retarded because it was a well constructed building. Private fire apparatus, hydrants and hose in yard. Persons in building, 77. Means of escape, doors. Value of building and contents, $175,000. Property loss, building, $1,000; contents, $100.

September 20, 1919. Chicago, Ill. William Erby & Sons Company. 121-127 W. Grand avenue. Auto bodies. One 4-story and basement building damaged. Walls, brick. Floors, wood. Roof, wood, tar, gravel. Cause, defective electric motor. Fire started at elevator shaft in rear on 2d floor. Discovered by citizen at about 3:25 p. m. Alarm, telephone. Duration, 45 minutes. Stopped at point of origin. Fire was favored by ordinary construction. Private fire apparatus, none. Means of escape, 2 inside stairways, 1 outside fire

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escape. Value of building and contents, $180,000. Property loss, $6,000.

September 18, 1919. Scranton, Pa. Sall Mountain Company. Mechanic street. Roofings and asbestos materials. One 1-story building destroyed. Walls, steel frame, wood covered with roofing. Floor, cement. Roof, wood covered with asphalt roofing. Cause, asphalt boiled over, condition of atmosphere. Fire started at saturation tank. Discovered by workman at 7:10 a. m. Alarm, box. Duration, 1 week. Stopped at adjoining buildings. Fire was retarded by construction of building. Private fire apparatus, Lackawanna Railway. Persons in building, 65 or 70. Means of escape, doors. Value of building, $250,000. Property loss, building, $120,000; contents, $120,000.

September 11, 1919. Chicago, Ill. 1458 W. Kinzie street. Glass, fixture, picture frame and cabinet factories. One 5-story building destroyed. Walls, brick. Floors, wood. Roof, wood. Cause, unknown. Fire started on 4th floor. Discovered by citizen at about 10:15 p. m. Alarm, telephone. Duration, 4 hours. Stopped on 5th floor. Fire was favored by construction of building. Private fire apparatus, none. Injured, 2 firemen. Means of escape, 3 fire escapes. Value of building and contents, $156,000. Property loss, $80,000.

August 26, 1919. Philadelphia, Pa. Karl Schlatter Dye Works, Inc. Southwest corner of Ontario and Hartville streets. Dye works. One 2-story building and several nearby dwellings damaged. Walls, brick. Floors, wood. Roofs, tin and slag. Fire started on 2d floor. Discovered by passerby at about 9:19 a. m. Alarm, box. Duration, 2 hours, 40 minutes. Stopped at roof. One person injured. No further information reported to SAFETY ENGINEERING.

August 20, 1919. Winston-Salem, N. C. George T. Nissen & Co. On public highway, 3 miles outside city limits, at Waughtown, a suburb. Wagon manufacturing. Main building, 2-stories in height, small outbuildings, damaged. Walls, brick, lime, mortar. Floors, ordinary joist construction. Roofs, metal. Fire started on 2d story. Discovered by night watchman at about 2 a. m. Alarm, telephone. Duration, 4 or 5 hours. Stopped in buildings of this same concern. No further information reported to SAFETY ENGINEERING.

August 14, 1919. Portland, Ore. Northwest Box Company. Foot of Montgomery street. Box factory. One 1-story building damaged. Walls, frame. Floor, frame. Roof, frame. Cause, unknown. Discovered by passerby at about 7:10 p. m. Alarm, street box. Duration, 2½ hours. Stopped at adjacent buildings. Firemen handicapped by delayed alarm. One person killed. Value of building and contents, $10,000. Property loss, practically total.

MERCANTILES, MISCELLANEOUS

September 17, 1919. Washington, D. C. Frank Shore. 1223 New York avenue, Northwest. Automobile accessories. One 3-story building damaged. Walls, brick. Floors, wood. Roof, wood and tin. No fire, but explosion of air tank for filling tires. Discovered at about 9:43 p. m. Alarm, street fire box. No further information reported to SAFETY ENGINEERING.

August 25, 1919. Philadelphia, Pa. A. Rose & Son. 2527-2541 East York street. Dealers in paper and bags. One 2-story building damaged. Walls, brick and wood. Floors, wood. Roof, tin and slag. Fire started on 1st floor. Discovered by watchman at about 5:10 p. m. Alarm, box. Duration, 3 hours. Stopped at 2d floor. Injured, 3. No further information reported to SAFETY ENGINEERING.

August 19, 1919. Detroit, Mich. S Grones. 8-10 Market street. Wholesale grocery. Three 3-story buildings damaged. Walls, brick. Floors, wood. Roofs, composition. Fire started on 1st floor. Discovered by citizen at about 8:20 p. m. Alarm, telegraph box signal. Duration, 12 hours. Stopped at adjoining property. No further information reported to SAFETY ENGINEERING.

August 19, 1919. Trenton, N. J. William J. Convery & Sons, Central street. Furniture store. One 4-story building damaged. Walls, brick. Floors, wood. Roof, slag, tin. Fire started in front, basement. Discovered by passerby at about 3:23 p. m. Alarm, street box. Duration, 5 hours. Stopped at 2d floor. No further information reported to SAFETY ENGINEERING.

MERCANTILE, TENANT BUILDINGS

September 9, 1919. Wildwood, N. J. Coombs building. Pacific avenue. Various mercantile occupancy. One 3-story building damaged. Walls, asbestos shingles on frame. Floors, wood. Roof, slag. Fire started in restaurant. Discovered by night watchman at about 3 a. m. Alarm, Gamewell system. Duration, 3 hours. Stopped at adjoining building. Persons in building, 17. Value of building and contents, $75,000. Property loss, total.

OIL WORKS AND TANKS

September 14, 1919. Philadelphia, Pa. Atlantic Refining Company. 35th and Ritner streets. Oil refiners. Tanks destroyed. Fire started in stills in yard. Discovered by employes at about 7:44 p. m. Alarm, street box. Duration, 9 hours, 45 minutes. No further information reported to SAFETY ENGINEERING.

September 10, 1919. Albany, N. Y. Sinclair Oil Refining Company. Tivoli street. Rosin oil. One 1½-story building damaged. Walls, brick. Floors, wood. Roof, wood. Discovered by employe at about 6:07 p. m. Alarm, fire signal station 461. Duration, 2½ hours. Stopped in same building. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $20,000 estimated.

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PAPER AND PULP MILLS

September 19, 1919. St. Stephen, N. B. Eastern Pulp Wood Company. Lumber camp at Goat Brook, 15 miles from St. Stephen. One 1-story building destroyed. Walls, board. Floor, board. Roof, board. Cause, unknown. Fire started around stove. Discovered from light in sky at about 8 p. m. Duration, 20 minutes. Stopped when building was consumed. Fire was favored because building was made of boards and tarred paper. Private fire apparatus, none. Value of building and contents, $600 or $700. Property loss, $600 or $700.

September 8, 1919. St. Louis, Mo. Brown Paper Company. 1218-1220 Spruce street. Paper warehouse. One 5-story building destroyed. Walls, brick. Floors, wood. Roof, composition. Cause, unknown. Fire started in rear. Discovered at about 4:32 a. m. Alarm, still alarm and street box. Duration, 5 hours. Stopped at same building. Fire was favored because it was a 2d class building. Private fire apparatus, none. Value of building and contents, $82,900. Property loss, $23,464.

PUBLIC BUILDINGS

September 24, 1919. Ottawa, Ont. Parliament Building. Parliament hill. Dominion Government building. Four stories in height. Walls, stone. Floors, concrete. Roof, concrete. Cause, rubbish. Fire started in basement. Discovered by watchman at about 8:05 p. m. Alarm, telephone. Duration, 15 minutes. Stopped in basement. Fire was retarded by concrete floors and fire walls. Private fire apparatus, none. Persons in building, 4 watchmen. Means of escape, doors from basement. Value of building and contents, $3 000,000. No damage to building.

September 21, 1919. Sherman, Tex. Grayson county courthouse. Fire supposed to have been caused by explosion in air-tight vault, explosion being caused by new composition floor in vault. Damage to vault, $15,000. Damage to contents, $500. Fire extinguished with 40 gallons of chemicals. No further information reported to SAFETY ENGINEERING.

RAILROAD PROPERTY

September 26, 1919. Altoona Pa. Pennsylvania Railroad. Machine shop. Locomotive repair shops. One 1-story building damaged. Walls, brick. Floor, cement. Roof, slate. Cause, overheated blast pipe. Fire started on roof. Discovered by workmen at about 2:11 p. m. Alarm, box, located at shop. Duration, 30 minutes. Stopped at roof of same building. Fire was retarded by construction of building. Private fire apparatus, hose reels in the shop. Persons in building, 125. Means of escape, doors and windows. Value of building and contents, $37,000. Property loss, $4,000.

STABLES

August 15, 1919. Three Rivers, Que. St. Maurice Paper Company's stables. St. Maurice street. Pulp and saw mill. One 2-story building damaged. Twenty-five horses killed. Walls, wood. Floors, wood. Roof, metal. Cause, believed to have been defective wiring. Discovered by watchman at about 11:53 p. m Alarm, telegraph. Duration, 2 hours. Stopped in building of origin. Value of building and contents, $35 000. Property loss, not reported to SAFETY ENGINEERING.

August 18, 1919. Wallingford, Conn. Riverside Stock Farm. 360 Quinnipiac street. Two 1½-story buildings destroyed. Walls, wood. Floors, wood; cement. Roofs, shingle. Fire started in hay. Discovered by passerby at about 7 p. m. Alarm, telephone. Duration, 6 hours. Stopped at 2d floor. Value of buildings and contents, $9,000. Property loss, not reported to SAFETY ENGINEERING.

THEATERS AND AMUSEMENT PLACES

September 16, 1919. Henderson, N. C. Liberty Theater. Garnett street. Theater. Two-story building. Walls, brick. Floors, wood. Roof, metal. Cause, dropping match or cigarette on film. Fire started at film rack. Discovered by operator at about 9:15 p. m. Alarm, fire alarm box. Duration, about 10 minutes. Stopped in same building. Fire was favored by construction of building. Private fire apparatus, none. Persons in building, about 125. Injured, 2. Means of escape, two, back and front. Value of building and contents, $16.000. Property loss, not reported to SAFETY ENGINEERING.

WAREHOUSES, PUBLIC STORES

September 10, 1919. Los Angeles, Cal. Pacific Electric Railway Storehouse. Seventh street. One 2-story building destroyed. Walls, brick. Floors, wood. Cause, undetermined. Discovered by night watchman at about 1:05 a. m. Alarm, telephone. Fire was favored by open construction. Firemen handicapped by delay in sending in alarm. Value of building and contents, $200,000. Property loss, total.

September 15, 1919. Philadelphia, Pa. C. H. Longcope, 1612-18 North 22d street. Flour and feed warehouse. Four 2-story buildings damaged. Walls, brick. Floors, brick and wood. Roofs, tin and slag. Discovered by passerby at about 9 p. m. Alarm, messenger and box. Duration, 6 hours 50 minutes. Stopped at roof. Injured, 5. No further information reported to SAFETY ENGINEERING.

September 25, 1919. Philadelphia, Pa. Martin Foley, 905 South Water street. Dealer in barrels. One 2-story storehouse damaged. Walls, brick. Floors, wood. Roof, tin and slag. Fire started on 1st floor. Discovered by employes at about

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10 a. m. Alarm, box. Duration 1 hour 20 minutes. Stopped at roof. No further information reported to SAFETY ENGINEERING.

WOODWORKERS

September 10, 1919. Cheboygan, Mich. Embury-Martin Lumber Company. Back from a street on lake shore. Saw mill. One 2-story building destroyed. Walls, wood. Floors, wood. Roof, sheet iron. Cause, supposed sparks from burner. Fire started at 11:30 p. m. Discovered by watchman immediately. Alarm, telephone. Duration, about 5 hours. Stopped when mill was consumed. Fire was favored by wood construction, with no partitions or walls. Firemen handicapped by being able to work from land side only. Private fire apparatus, steam pumps, in separate building which were put out of commission by mill smokestack falling on them. Persons in building, 2. Means of escape, stairways and tramways. Value of building and contents, $50,000, estimated. Property loss, total.

KILLED AND INJURED

July 20, 1919.—Forest Grove, Ore.—Various small stores on College Way. Two persons injured.

July 23, 1919.—Chicago, Ill.—Various dwellings and apartment houses on Mackinaw Avenue, near 85th street. One fireman died from effects of injuries.

August 14, 1919.—Portland, Ore.—Northwest Box Company. One person killed.

August 25, 1919.—Philadelphia, Pa.—A Rose & Son. Three persons injured.

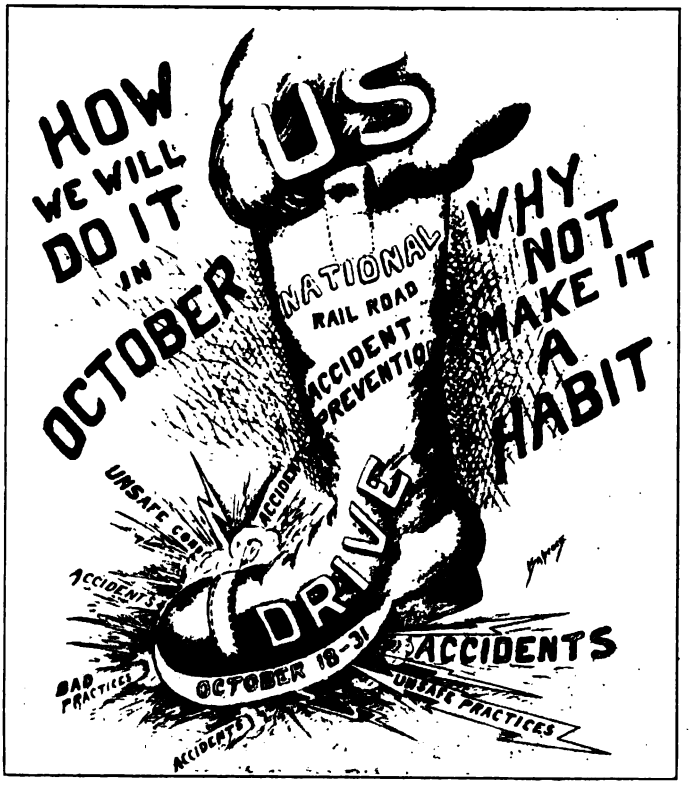
August 26, 1919.—Philadelphia, Pa.—Karl Schlatter Dye Works, Inc.—One person injured.

September 11, 1919.—Chicago, Ill.—Factory building on West Kinzie street. Two firemen injured.

September 15, 1919.—Philadelphia, Pa.—C. N. Lorgcope. Five persons injured.

September 16, 1919.—Henderson, N. C.—Liberty Theater. Two persons injured.

Why Not Make It a Habit?



Cartoon by F. H. Babcock, Safety Agent, P. & L. E. R. R.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

SHEET METAL SHOWER BATHS AND WASH SINKS

Safety engineers who are looking for inexpensive and durable showers and wash sinks should give their attention to the products of the Cleveland Blow Pipe & Manufacturing Company. The shower baths illustrated below are made from heavy gauge galvanized steel; edges are re-enforced with angle iron; gusset plates are attached to the top and bottom, holding frame perfectly rigid. Each unit is 7 feet 29 inches high, furnished with ½-inch globe valves, pipe and elbows leading into a cast brass shower head. A 2-inch drain is provided in the bottom. Showers are painted on the inside with waterproof paint. A curtain across the front makes each section private. These showers are portable and can be easily moved to any part of the plant in case future changes demand.

Sheet Metal Wash Sink

The wash sink, illustrated herewith, is equally well constructed and is fitted with eight faucets, connections for hot and cold water and four soap dishes. The sink is 8 feet long and 2½ feet deep, 30 inches high, with a 2 foot drain on the bottom.

The manufacturer says that more than 200 of these showers and sinks are in operation, giving splendid service. It is interesting to note the list of prominent concerns using them. Further particulars can be obtained from the manufacturer.

Sheet Metal Shower Bath

A NEW IDEA IN SAFETY FILMS

Harry Guilbert, manager of the safety department of the Haskell & Barker Car Company Michigan City, Ind., recently completed a safety film entitled "The Chance Taker Is the Accident Maker." The film is entirely free from the "sob stuff" which has been used so successfully, and on that account it should strike an entirely new response, that is, reach the type of man who has not been affected by sentimentality.

The pictures, all taken in Mr. Guilbert's plant, are reproductions of actual accidents, and wherever possible the man actually involved in the original accident posed for the reproduction of it.

Although there is no thought of distributing the films on a commercial basis, they are available for use by those requiring them Particulars can be secured from Mr. Guilbert, by addressing a request to him at the above address.

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A NEW MOTOR-STARTING SWITCH SWITCH

A new type of motor-starting switch, which is low in first cost but provides complete protection to both the operator and the motor, has been placed on the market by the Westinghouse Electric & Manufacturing Company. It is known as the type WK-100 switch and is designed for connecting single or polyphase alternating-current motors of from 1 to 10 horsepower, 250 and 550 volts, directly to the line without the use of auto-transformers or resistance.

Type WK-100 Motor Starting Switch, Showing Cover Open

All of the mechanism with the exception of the operating handle is enclosed with a steel box. Parts needing regular inspection are easily accessible on opening a door in the cover; but this door cannot be opened except when the switch is in the off position (nor can the switch be closed when the door is open), and all parts reachable are then dead. Therefore it is impossible to

Type WK-100 Switch Cover Closed

receive injury from contact with live parts when either operating or inspecting the switch or making ordinary adjustments and renewals. The upper part of the cover is held in place by screws and so can be removed without difficulty by authorized persons, thus exposing the entire mechanism to inspection.

No-voltage protection to the motor is provided by a magnetic release which opens the switch automatically on a failure of voltage. Overload protection is provided by means of current relays, resembling cartridge fuses in appearance. A contact in each relay is connected in series with the under voltage release magnet. Harmless momentary overloads do not effect the relays, but, as soon as the load on the motor becomes dangerous, the relay contacts open the magnet circuit and the switch automatically flies open. The relays then automatically reset themselves. The switch is so arranged that it cannot be kept closed on an overload or no-voltage, even if the handle is held in the off position.

The entire mechanism is mounted on a slate base and can be removed as a unit without disturbing the box or the conduits. Damaged switches are, therefore, easily replaced.

NON-SLIPPING FLOORS

Where oil is splashed in large quantities on wooden floors the floors rapidly acquire a slippiness which is highly dangerous. The first impulse is to scatter sawdust and sand, and this method produces a condition far from sanitary.

With the scarcity of help frequent scrubbing of such floors is expensive, and the amount of muscle necessary to secure the proper results is a severe task on the person doing the work.

The American Scrubbing Company has introduced the Finnell System of power scrubbing, which is accomplished by rotating brushes actuated by an electric motor, and through these brushes a liberal supply of soap and water is applied to the floor. They also follow this up with a water absorber which finishes the job and leaves the floor in a clean and dry condition.

It would seem that this is distinctly in the line with safety as well as sanitation, and it proves most effective where conditions are favorable.

The American Scrubbing Company will gladly furnish further particulars to those interested.

TEMPORARY SIGNS

There are many times when a temporary safety sign should be erected covering some temporary danger. A blue crayon and a piece of wrapping paper are unsatisfactory and do not command attention.

The Magnet Advertising Company has prepared a long list of water-proof cardboard signs covering nearly every situation that could arise. The signs are attractive, compelling the attention. Another way in which these signs are used is for general educational work, the signs being changed at frequent intervals on the theory that a man becomes accustomed to a thing he sees regularly. Further particulars and samples can be obtained from the manufacturer.

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ALUNDUM TILE NON-SLIP TREAD

In building construction a feature which has lacked development is the means of preventing accidents due to slipping. This hazard can best be appreciated when we realize that in the Borough of Manhattan, in New York City, 144 persons lost their lives in 1917 by falls on stairs and sidewalks. In Chicago, in 1916, 461 persons were killed in a similar way.

The seriousness of this situation is steadily receiving more and more recognition, and laws are constantly being enacted to enforce necessary precautions. All of these facts place the responsibility directly upon builders and property owners of making a careful study of the liabilities which they may be incurring by neglecting to take whatever precautions the law requires or in allowing to remain unsafe any risks of this nature.

The most common accident of this sort is that of falling down stairs. This danger is made all the more common from the fact that the pitch, the breadth of the tread and the distance between steps vary so greatly that it is necessary to depend almost wholly upon guaging these distances by eye. Usually this is done largely by instinct, and unless a secure footing is assured any miscalculation will result in a fall.

A similar risk is run when a person approaches a descending grade such as is commonly found in railroad and subway stations. Such ramps are ordinarily made of a mosaic or concrete construction, which readily wears smooth and offers the most uncertain type of footing.

Before placing a product on the market to meet this demand the Norton Company made a careful study of the adaptability of its Alundum brand of artificial aluminous abrasive. This material, in grain form, bonded with fusible clays has long been known in the metal trades as one of the leading substances from which grinding wheels are manufactured. These wheels are used on every variety of grinding operation, from that of rapidly removing metal to obtaining a high lustrous polish, so that the correct formula to be used in the manufacture of a nonslip tile presented a relatively simple problem.

To those interested in studying the physical properties of Alundum tile the results of a series of tests conducted in the laboratories at Columbia University deserve attention. The tests were made in order to establish beyond doubt a number of questions pertaining to the value of Alundum tile as a building material to be used in surface construction. The details of the experiments are obtainable in a booklet devoted to this subject, so that it is only possible in this article to review the Columbia University report in a general way.

The tests examined Alundum tile from the following eight distinct angles:

1. Tensile strength.
2. Compressive strength.
3. Transverse strength-modulus of rupture.
4. Toughness.
5. Absorption.
6. Adhesion to cement mortar.
7. Fire resistance.
8. Transverse strength of a concrete stair tread slab inlaid with Alundum tile.

The question very naturally arises as to the value of these separate tests. For this reason it may not be out of place to discuss each one briefly.

An investigation of the tensile strength of Alundum tile is certain to reveal what action will take place after the tile is in place and is subjected to the stresses caused by constant footwear. The tensile strength of the tile also directly effects its power to support transverse loads.

Fifteen briquettes having an area at the reduced section of approximately one square inch underwent a stretching action in a heavy type of testing machine. The result showed that the tensile strength averaged approximately one ton per square inch. The exact figure was 2138 pounds. This was after drying period of only seven days.

To find out just how much resistive power to a crushing action any substance possesses it is given a compressive strength test. This work was done in a hydraulically driven machine and showed for Alundum tile an index of about 15,000 pounds per square inch. This proves unquestionably the unlikelihood of any disintegrating action taking place due to crumbling under pressure.

Any material intended for the purpose to which Alundum tile is put should be capable of holding up under any normal transverse stress it may be caused. If it cannot withstand bending action it is sure to fail when applied to an uneven surface. The data for this transverse strength test was obtained by supporting between rollers 9½ inches apart pieces 1 inch square of the material from which Alundum tile is made. The weight was then applied at the center of the span. Of a number of specimens tested the average weight which could be supported was found to be 402 pounds, representing a modulus of rupture of 5,404 pounds to the square inch.

The United States Department of Agriculture has published in bulletin form the average value of the toughness of various types of rocks. Of these trap rock is rated the highest with an index value of 18, representing the height in centimeters from which a hammer weighing 2 kilograms must drop in order to break apart the specimens under consideration. These values show indices of 5 for marble; 7 for limestone; 8 for granite and 10 for sandstone. As all of these materials listed are commonly used as building materials, this same test applied to Alundum tile showing a value of 17 indicates beyond question its extremely high relative value from this standpoint.

The degree to which any tile will absorb moisture is worth studying so far as this

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feature may affect the likelihood of cracks developing due to freezing. In the laboratory it was found that Alundum tile will take up water only to the extent of about 1.32 per cent of its original weight. This tile has been subjected out of doors to extremely low temperatures for long periods without any sign of cleavage taking place. This may probably be accounted for from its close grained, uniform structure which does not allow sufficient intersticial space for the accumulation of enough moisture to expand with force.

One of the most interesting tests which was conducted was that which disclosed the bonding strength which Alundum tile has to cement mortar. To be a success a tile must remain in place during its entire life and become an integral part of the structure into which it is set. The person using a stairway or walk requires above all else a solid, immovable foundation. The architect needs to feel assurance that an installation once made need not be relaid.

Briquettes made of Alundum tile material and a one to one mixture of cement mortar, set end to end, having a contact of approximately 1 square inch, were tested in a Fairbanks Shot Briquette Machine. Of the seven specimens to which this test was applied the adhesive strength between the tile and the mortar was found to range from 255 pounds to 357 pounds per square inch with an average of 282 pounds. All of these readings were taken after a drying period of only seven days. A further test showed that the bonding strength of Alundum tile with the cement mortar amounted to 85 per cent of the full strength of mortar alone.

These facts show conclusively that in stair and floor construction, where cement may be used as the bonding medium, no anchorage for this tile is necessary beyond that which results from the union with the cement. This obviates all additional devices for holding the tile in place and makes it possible to lay a perfectly plain, slip-proof surface, free from bolts, plates or screw heads, which detract from the appearance and practical ends of a safety tread.

In the manufacture of Alundum tile the particles of abrasive grain are fused one to another in kilns at a temperature ranging in the neighborhood of 2,500 degrees Fahrenheit. This high heat is one of the essential factors in the production of Alundum tile, and, because each piece has passed through this process, it is impossible for any crumbling or disintegration to occur should it be a part of the construction of a building in which a conflagration takes place. The probable maximum temperature reached in a fire in a building is estimated as being 1,700 degrees Fahrenheit. This classes Alundum tile as positively fireproof.

One of the many forms in which Alundum tile may be adaptable to stair construction is in the form of concrete slabs into which the tile are set. This applies particularly to replacement work where worn treads may be readily and economically repaired. Such construction must be capable of supporting great loads without buckling.

A typical slab of this kind measuring 4 ft. 6 inches long, 1 foot wide and 2 inches thick, supported at either end, was tested by applying weight to its center and withstood nearly 1000 pounds. At this point a crack developed, but each tile remained undisturbed.

This in general summarizes the laboratory tests which were applied to Alundum tile. Without exception the necessary physical characteristics were thereby established and the most exacting requirements successfully met. An actual service test alone remained necessary, and for this purpose a stairway offering the greatest possible concentrated service was selected. These stairs are in the subway of the Grand Central Terminal at New York City.

Over these stairs 25,000 to 30,000 persons pass daily up and down. In January, 1915, Alundum tiles were installed. Today these same tiles are in place, unaltered and showing little or no wear. Over 30,000,000 pairs of feet have passed over these steps, and from every evidence this service will continue indefinitely. During this period no accidents have occurred, no repair work has been done.

"TRUMBULL CHEER"

The September issue of this publication sustains the high standard that has marked it in the past. Although the recurring motto, "Put 'Circle T' on Your Orders," and the running page head, "'Safety Push and Snap Switches," bring the reader back to business on each page, yet the contents are by no means confined to exploiting the products of the Trumbull Electric Manufacturing Company, but cover as broad an area of literature, humor, politics and philosophy as the average general magazine. It is very readable from cover to cover.

CORK GRIP LADDER SAFETY SHOES

Because of the natural non-slipping properties of cork and its ability to absorb oil and grease, the Safety Service & Engineering Company of Cleveland decided to use cork to manufacture a safety ladder shoe in fact as well as in name.

This company has recently placed on the market the Cork Grip Ladder Safety Shoe. The shoe consists of a block of cork 1 inch thick, 7 inches long and 3 inches wide inserted in a steel frame. The principal feature of the shoe is that none of the metal touches the floor, the bolt heads being countersunk in the cork.

Applied tests show that the average-weight ladder carrying an average-weight man requires 20 square inches of non-slipping sur-

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face on each shoe as the minimum surface that can be safely used. The Cork Grip Ladder Safety Shoe has 21 square inches of non-slipping, absorbing and resilient surface, a liberal factor of safety above that shown by tests to be necessary. This safety shoe will not only grip a wood, concrete, dirt or brick floor, but, what makes it more valuable and protective, it will hold any oily, greasy, steel or iron floors. The manufacturer says that several thousand pairs of these shoes are being used in manufacturing plants of all kinds throughout the United States, one company alone using 1,500 pairs.

Readers desiring descriptive literature should write the company for booklet SE.

GOOD HOMES MAKE CONTENTED WORKERS

The workman's chief interest is in his home. If it is unhealthy and uncomfortable neither he nor his family will be happy or effective as citizens, and discontent is a serious breeder of trouble. It is now becoming generally recognized that adequate and proper housing is essential to the employer who would have an efficient working force. Happy workers mean careful men and big profits. while unhappy workers are never a good investment. They are careless and many times cause serious accidents. not only to themselves but to their fellow workers.

An illustrated 16 page booklet, entitled "Happy Homes Make Contented Workers," has been issued by the Industrial Housing Associates. The booklet contains many diagrams and illustrations of 6 and 7 room cottage houses for industrial workers.

The Industrial Housing Associates are ready to co-operate with you to make your housing adequate, attractive and a permanent asset to your company and community. They will welcome an opportunity to give advice on your housing problem. All communications should be addressed to the above company at 137 South Fifth street, Philadelphia.

TRUMBULL ELECTRIC MANUFACTURING CO.

The Trumbull Electric Manufacturing Company, maker of the famous "Circle T" Safety Switches. announces the appointment of M. L. Spaulding as manager of the Chicago office, 40 South Clinton street. Mr. Spaulding, formerly a member of the Chicago office sales force, two years ago accepted a position as general sales manager of one of the large electric supply jobbers in the Middle West. He has been in the electrical business for many years and is widely known in the Middle West.

STRONG, KENNARD & NUTT COMPANY

The Strong, Kennard & Nutt Company, Cleveland, has issued catalog "D," concerning its safety, first-aid and welfare equipment. Its pages contain numerous illustrations and interestingly describe the features and merits of each device listed.

As new ideas and new safety devices are continually being developed, the catalog has been issued in loose leaf style, so that new leaves featuring new or additional devices may be added from time to time.

Among the devices featured in catalog "D" are: protection and welding goggles, emergency first aid room equipment, helmets, respirators, punch press guards, safety belt sticks, safety guards for planers and surfacers, safety set screws, non-explosive safety cans, sanitary factory equipment, drinking fountains, playground equipment and safety signs.

Copies may be obtained by addressing a request to the company.

KING FACE MASKS FOR INDUSTRIAL USE

The Julius King Optical Companys says in its new catalog on face masks and helmets that "the greatest innovation in the matter of eye protection since we invented safety goggles, some years ago, is our new model face mask."

It was found that welders in the Navy yards complained bitterly against goggles being heavy, too hot, and offering no protection from splashes of metal lodging between the eyes above the nose. One large steel plant had an oxy-acetylene operator out 3 months from a splash of molten metal that had lodged in the nose. A large railroad reported a serious case where the orifice of the ear was badly burned by a splash.

As now made, the new model face mask is supported by a band over the head, so the weight is not apparent, and it is as comfortable to wear as a cap. The mask itself is made of fibre and as a consequence will stand almost any amount of abuse and last indefinitely. It may be turned back over the head when not in use.

There is a free circulation of air between the front and the face, not only keeping the operator cool, but preventing the tendency of the lenses to fog.

The catalog also illustrates the King Arkweld Helmet, the King Babbitting Mask and other King protection masks. It also shows the new King Face Mask being used in connection with the operation of a ferro-silicon furnace and at a reheating furnace.

The Julius King Optical Company will send a copy of the catalog to any one on request.

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UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

BLOWPIPES—Milburn Co., Alexander, The, Mfr., 1420 W. Baltimore St., Baltimore, Md.

CABINETS AND CUTOUT BOXES—SHEET METAL—United Metal Box Co., Mfr., 49 Sixth Ave., New York City.

CARTRIDGE FUSES—Ward Electric Co., Submittor, 1411 Walnut St., Philadelphia, Pa.

CHEMICAL EXTINGUISHER, 1 QT. PUMP TYPE—American La France Fire Engine Co., Submittor, Elmira, N. Y.

CHEMICAL EXTINGUISHER, 1-QT. PUMP TYPE—Badger Fire Extinguisher Co., 34 Portland St., Boston, Mass.

CHEMICAL EXTINGUISHER, 1-QT. PUMP TYPE—Fire Gun Mfg. Co., Mfr., 17 Battery Pl., New York, N. Y.

CHEMICAL EXTINGUISHER, 1-QT. PUMP TYPE—Fyr-Fyter Co., The, Mfr., 32 S. Jefferson St., Dayton, O.

CHEMICAL EXTINGUISHER, 1-QT. PUMP TYPE—Manville Mfg. Corporation, Mfr., New Rochelle, N. Y., Johns-Manville Co., H. W., Sole Selling Agent, Madison Ave. and 41st St., New York, N. Y.

CHEMICAL EXTINGUISHER, 1-QT PUMP TYPE—Pyrene Mfg. Co., Mfr., 52 Vanderbilt Ave., New York, N. Y.

CHEMICAL EXTINGUISHER, 1-QT PUMP TYPE—Harker Mfg. Co., Submittor, 410 Pearl St., Cincinnati, O.

CHEMICAL EXTINGUISHER, 2½-GAL. BREAK BOTTLE TYPE—McFarland Co., J. C., Mfr., 27th and S. Wells St., Chicago, Ill.

CHEMICAL EXTINGUISHER, 1-QT., STORED PRESSURE TYPE—Nu-Ex Fire Appliance Co., The, Mfr., Columbus, O.

CLASS C PREPARED ROOF COVERINGS—Cleveland-Akron Bag Co., The, Mfr., 40th St. and Perkins Ave., Cleveland, O.

CLASS C SHINGLE ROOF COVERINGS—Cleveland-Akron Bag Co., Mfr., 40th St. and Perkins Ave., Cleveland, O.

COMBINATION WELDING AND CUTTING BLOWPIPE—Carbic Mfg. Co., Submittor, Duluth, Minn.

CONDUIT BOXES—Appleton Electric Co., Mfr., 218-220 N. Jefferson St., Chicago, Ill.

CONNECTION BLOCK—Benjamin Electric Mfg. Co., Mfr., 120 S. Sangamon St., Chicago, Ill.

CURRENT TAPS—Hessco Electric Mfg. Co., Mfr., 33 Church St., Toronto, Ont.

CUTTING BLOWPIPE—Oxweld Acetylene Co., Mfr., 646-686 Frelinghuysen Ave., Newark, N. J.

ENCLOSED SWITCHES—Safety Electric Co., Mfr., 59-65 Columbia Sq., San Francisco, Cal.

FOLDING STEEL LADDER—Vaughan & Bushnell Mfg. Co., Mfr., 2130 Carroll Ave., Chicago, Ill.

GROUND CLAMPS—Zisterer, Emil C., Mfr., 4701 W. 12th Pl., Cicero, Ill.

HIGH-PRESSURE GAS GAUGE—Air Reduction Sales Co., Submittor, 120 Broadway, New York, N. Y.

HIGH-PRESSURE GAS GAUGE—American Welding Co., Submittor, 2724 S. Michigan Ave., Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—Burdett Oxygen Co., Submittor, 309 St. John's Ct., Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—Carbic Mfg. Co., Submittor, Duluth, Minn.

HIGH-PRESSURE GAS GAUGE—Davis-Bournonville Co., Submittor, New York, N. Y.—Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—Federal Brass Works, Submittor, 3100 S. Kedzie St., Chicago, Ill.

OUTLET BUSHINGS—Phelps, James C., Mfr., 919-25 West St., Cleveland, O.

OUTLET BUSHINGS—Phelps, James V., Mfr., Springfield, Mass.

OUTLET BUSHINGS AND FITTINGS—COUPLINGS, ELBOWS AND TEES—Thomas & Betts Co., Mfr., 63 Vesey St., New York, N. Y.

PANELBOARDS—Electrical Mfg. Co., The, Mfr., 4149 E. 79th St., Cleveland, Ohio.

PANELBOARDS—Starrett Mfg. Co., Mfr., 523 S. Green St., Chicago, Ill.

PLUG FUSE CUTOUT BASES—Arrow Electric Co., The, Mfr., Hartford, Conn.

PORTABLE TANKS—Gilbert & Barker Mfg. Co., Mfr., Springfield, Mass.

PUSH FLUSH SWITCHES—Paulding, Inc., John I., Mfr., New Bedford, Mass.

PYRONO COMPOSITE CORRIDOR AND ROOM PARTITION DOORS AND FRAMES—Compound and Pyrono Door Co., The, Mfr., St. Joseph, Mich.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Central Electric Co., Mfr., 320 S. Wells St., Chicago, Ill.

SLIDING AND SWINGING SHEET METAL FIRE WALL DOOR—Barry Fire Door Co., Mfr., 4235-41 Ogden Ave., Chicago, Ill.

SLIDING AND SWINGING, TIN-CLAD, FIRE WALL DOOR—Fire Door Contracting Co., Mfr., 412-16 East 23rd St., New York, N. Y.

SLIDING OR SWINGING, TIN-CLAD, FIRE WALL DOOR—Moose Jaw Heating & Plumbing Co., Ltd., Mfr., 64 High St., W., Moose Jaw, Sask., Can.

SLIDING AND SWINGING, TIN-CLAD, FIRE WALL DOOR—Standard Fire Door Co., Mfr., 1105 O'Fallon St., St. Louis, Mo.

SURFACE SWITCHES—Paulding, Inc., John I., Mfr., New Bedford, Mass.

SWEEPING COMPOUND—Martin Foeste, Mfr., 87 Barham St., Paris, Texas.

SWEEPING COMPOUND—Industrial Laboratories, Inc., Mfr., Fort Smith, Ark.

SWINGING METAL-CLAD VERTICAL COMMUNICATION DOOR—St. Louis Fire Door Co., Mfr., 15th St. and Clark Ave., St. Louis, Mo.

SWITCH BOXES—Adapti Mfg. Co., The, Mfr., 919-25 West St., Cleveland, O.

TRANSFORMERS — BELL RINGING — Killark Electric Mfg. Co., Mfr., 3940 Easton Ave., St. Louis, Mo.

UNDERGROUND STORAGE TANKS—Freeland Sons Co., B. F., Mfr., Sturgis, Mich.

UNITED STATES ISSUE "A" AUTOMATIC SPRINKLER—United States Automatic Sprinkler Co., Mfr., 1392 Lexington Ave., New York, N. Y.

WASTE CANS—Reed & Co., Geo. W., Ltd., Mfr., 37 St. Antoine St., Montreal, Canada.

WIRES — MISCELLANEOUS — Beldon Mfg. Co., Mfr., 23rd St. and Western Ave., Chicago, Ill.

WIRES—SLOW-BURNING—Northern Electric Co., Ltd., Mfr., Montreal, Que.

WIRE CONNECTORS—French Mfg. Co., The, Mfr., Grandview Ave. and Robbins St., Waterbury, Conn.

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Safety Engineering

Vol. 38 NOVEMBER, 1919 No. 5
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The Safety Engineer—His Qualifications and Duties

By Chester C. Rausch

Proceedings of the American Society of Safety Engineers

TO attempt deliberately to define the duties which should be included as reasonable for a particular class of work or profession, and to indicate the qualifications and training necessary to fit persons to perform such work, is to invite endless and often pointless discussion and to bring forth statements of opinion from almost as many different sources as there are persons who hear these points enumerated. A person who takes such a step must be willing to forego sympathy with his ideas on the part of many of those whom he has previously counted as his friends, and to meet vigorous opposition from them and others in whose minds he may arouse a feeling of contradiction.

The English language has possibilities of clear and beautiful definition, but the unfortunate American custom of using words carelessly, of distorting their meaning and of falling into colloquialisms and superlatives, has resulted in a confusion of ideas and a misunderstanding of the meaning of words commonly used by many people who do not usually give careful thought to what may be inferred from their utterances, or to clearly define what they intended to be meant by the use of a particular expression. It is to clarify one such general misconception that this paper has been prepared.

No other generic term is probably more frequently used in business nomenclature or more universally misapplied in such use than the word "engineer." There has sprung up in recent years through tolerance on the part of the public and a certain gullibility on the part of many employers a tendency for men partly trained in technical matters to use the word "engineer" as a noun to designate themselves, and to precede it with almost any adjective they choose to affix to such a noun to qualify their particular efforts.

I need only to mention the fact to draw your attention to it, that, aside from the fundamental divisions of engineering work into civil, mechanical, electrical, mining and chemical, there often develop many subdivisions of these main groups defined by such familiar adjectives as efficiency, production, sanitary, hydraulic, safety, automotive and others without limit. Many of these subdivisions logically belong under some one of the fundamental divisions with which we have been familiar for so many years. Much work classified as engineering would not, when closely scrutinized, be considered as a branch of engineering at all, although it might at times involve some engineering work and principles to some extent.

MISUSE OF THE TERM "ENGINEER"

The increasing tendency for men to train as specialists in a particular type of work—in fact, our complex life makes any other course almost impossible if one would seek any measure of success—has resulted in the appropriation by these various specialists of credit for training in various branches of engineering, and to set them forth in such

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terms that those who have not thought clearly or been well informed have been led to believe that the works of these men were new creations. Many employers who have sought the services of such men without careful and systematic investigation have been woefully plagued by their failure to secure the services and results they believed they would obtain. Much ill repute has been cast upon the engineering profession as a whole by these impostors and so has made the legitimate work of engineers far more difficult.

May I explain what I mean by using a single illustration? Civil engineering, in its broadest concept, primarily has to do with the design, construction and operation of work and structures necessary for the development of large land areas by such means as railroads, highways, drainage systems and sewers, canals and waterways, and the impounding and use of water for power or potable purposes. One subdivision of civil engineering has come to be known as "hydraulic engineering" and is concerned almost entirely with the impounding, conveyance, distribution and use of water for power. After the water has been impounded, its further use is carried on under the direction of various engineers. Fire protection engineers are concerned with the development of systems of protection against fire that require the use of water largely, and frequently work jointly with another branch of engineering very closely connected with it, namely, that of supplying water for potable purposes. Again, plumbers who, within the limits of a single structure, prepare and install the conveying system for supplying water and its removal as waste are in some measure engineers when they design such work as well as erect it, but of late years sanitary engineers have not only largely supplanted the plumbers, who have become more or less mechanics concerned with installation, in the design of this work, but have gone farther in this branch of engineering and are now concerned with the purification of water supplies, the disposal of sewage and the elimination of all sources of contamination on water sheds supplying potable water. They have enlarged their scope of work to include, beside a knowledge of hydraulics, a knowledge of biology. The bridge designer and the designer of large steel structural forms for various purposes are members of the same civil engineering group, although they have little in common with the sanitary engineer or the road builder. Different as the problems of these various men are, their work is directly, when carried back to its fundamental source, a part of civil engineering.

In exactly the same way various subdivisions of mechanical engineering have developed as specialties, and men who are truly engineers are engaged in most of them. Perhaps the single reason why men fundamentally trained as engineers are usually engaged in such work is because the problems are inherently those requiring sound technical knowledge concerning Nature's laws and forces, and much training and experience in their application to problems that arise in the work done in this world.

In the last few years a new field of work requiring the services of men who are more or less technically trained has grown into our industrial life. Its activities have been generally grouped under the generic head or general term of "safety." Like all new movements it developed as the result of an evident need, but without the limitations as clear and distinct as those controlling some of the other lines of engineering. This condition is largely due to the fact that safety work does not deal wholly with inanimate objects and materials whose actions can be predicated by means of cold calculations, but concerns the actions and habits of the minds and bodies of individuals in conjunction with their individual use of forces and materials controlled by various forces acting under the definite laws of Nature. It is this element of uncertainty, this human factor in conjunction with the other forces and factors that are, or can be, guided or controlled that has led to much of the misapprehension on the part of many employers

(*Continued on page* 297)

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More Little Journeys in Fire Protection: Fire Walls

By Charles E. Worthington

Illustrations drawn by Miss Gertrude M. Worthington

IN matters of fire prevention as in other matters this is verily an era of propaganda. Architects and engineers of world-wide reputation address us on vital matters; the National Board of Fire Underwriters scatters information broadcast and profusely, and the National Fire Protection Association grinds out a steady grist of what to do and how to do it, until we are tempted to paraphrase Solomon and say, "of the making of rules there is no end."

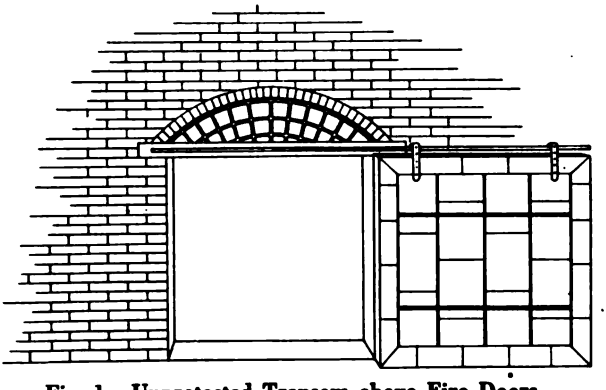

Fig. 1. Unprotected Transom above Fire Doors

It requires both technical knowledge and wide experience in a practical way to be able to make regulations for the guidance of other people, and at that the team is unevenly matched, for the technical knowledge is the fruit of the labors of a thousand lives, and the practical experience at best but limited and not even the full fruit of one.

So the question always confronts us, as to how completely understandable and workable are our regulations, and how clear and effective our arguments in their support for, however valuable may be the suggestions offered, unless the attending argument suffices to convert to our way of thinking, the application is likely to be half-hearted and experimental, quite likely, unsatisfactory.

APPLYING THE REGULATIONS

It is interesting at least to glance over results which, although in the main encouraging, reveal in some instances some very curious conditions, and in the occasional recurrence of these we must seek for some reason for our partial failure to impress.

The general theory of fire walls has been thrashed out pretty fully, especially as regards fire doors and the reason for installing them, the intent being fully to arrest the progress of fire.

Understanding the extent of the effort, a reproduction of some fire doors found a few years since in a large factory, the plans for which were drawn by a firm of mill architects and engineers doing business in a dozen States and the construction supervised by them, is somewhat suggestive.

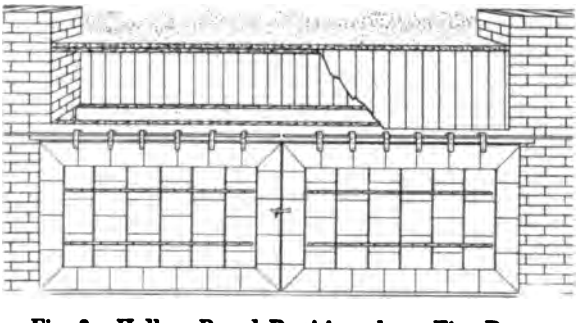

Fig. 2. Hollow Board Partition above Fire Doors

Fig. 1, glass transom over fire door, shows a condition that was repeated several times in that particular factory

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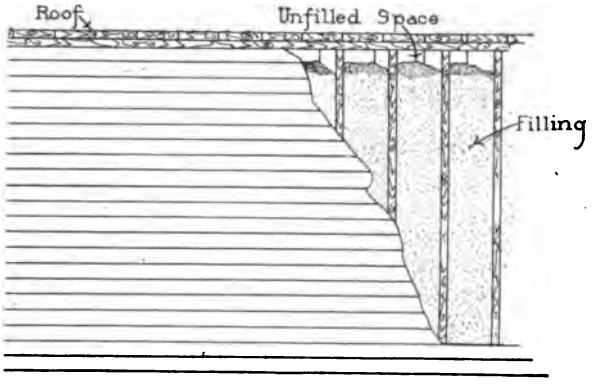

Fig. 3. Incomplete "Nogged" Wall Offered as Fire Wall

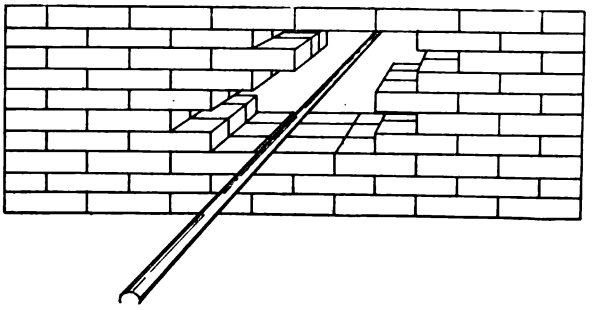

Fig. 4. Pipe Hole through Brick Wall. The Usual Wrong Way

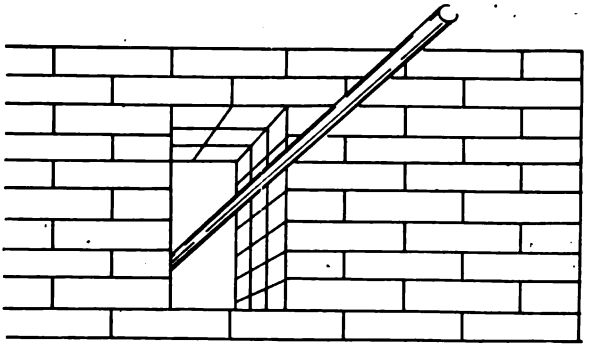

Fig. 5. Another Wrongly Constructed Pipe Hole

and has been practically duplicated in many instances elsewhere.

Evidently the requirements for fire doors on both sides of the wall at the door opening had been duly impressed and faithfully carried out, but, seemingly, with strict compliance with a bare regulation, the matter rested. There was no effort at a reasoning compliance nor was any further thought given, and the outcome might be called absurd.

Not very many years ago a mill architect and engineer doing a considerable business in a large city and enjoying a good reputation planned a structure of considerable size, which he was asked to subdivide by "parapet brick fire walls" with fire doors at a necessary communicating opening.

Now this was not a country builder of little experience in important work and of perhaps limited technical knowledge, but an educated architect and engineer of considerable pretensions, and it would naturally be inferred that the request carried its own detail. Yet when the building was sufficiently completed for an examination, a somewhat surprising condition was disclosed.

Fig. 2 illustrates boarding over doors. The structure was a one-story affair, and while the parapet wall was constructed, when the door opening was reached it was *omitted* and a wood beam thrown across at the proper height to carry the fire doors, the tracks for which were screwed to the wood. Above this beam the space to the roof was boarded in on both sides with 7/8" matched spruce boards, forming a hollow wood partition for the entire width of the opening.

These examples, while of course flagrant violations of common sense and rare, are still abundant enough in kind to be entitled to grave consideration in considering the matter of fire protection from a psychological viewpoint.

SOLID FIRE WALL ASKED FOR

Another example of how not to do it

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is shown in Fig. 3, opposite. In this case a solid fire wall was asked for, of brick or concrete, but to be carried to *contact* with roof only, the structure being of moderate importance and the design being to partition off a more hazardous section from the rest. In this case the professional architect does not enter, although a reputable builder was employed.

The method employed in building the "solid fire wall" shown in Fig. 3 was to construct a hollow frame partition by sheathing on both sides of a 2"x4" scantling frame. Then the upper line of boards was removed, and rough concrete poured into the spaces between studs, filling them imperfectly, there being no means of tamping.

This left a space above the concrete, which of course stopped at the lower line of the removed board, which was unfilled but concealed by replacing the boards. So that nowhere did filling in the "nogged" wall come within 8" of the roof boards.

The figures shown are sketches, not photographs, but are very close to the actual facts, differing only in some minor and wholly unimportant details.

Probably every one of considerable experience can recall numerous instances approaching these in general character.

These instances are of course frankly reminiscent, though not belonging in ancient history, one dating within two years, and the counterpart of another within 4 or 5. They are not cited as freaks because they can hardly be so termed, but merely to indicate that there is at least a percentage of cases where we have failed in our effort to impress, not so much the bare rules as the reasons underlying them, some understanding of which is necessary for the application of very carefully drawn regulations.

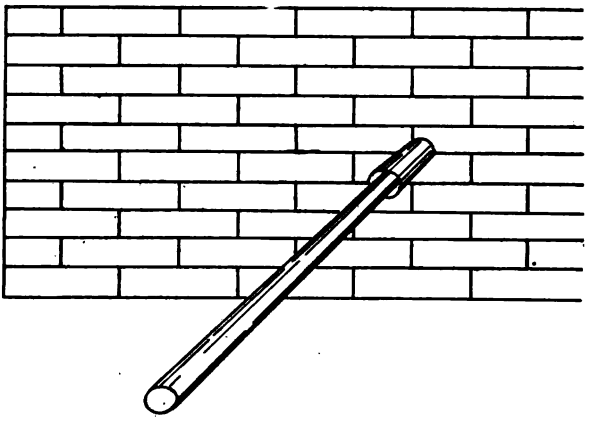

Fig. 6. Pipe Hole with Sleeve or Bushing. A Correct Method

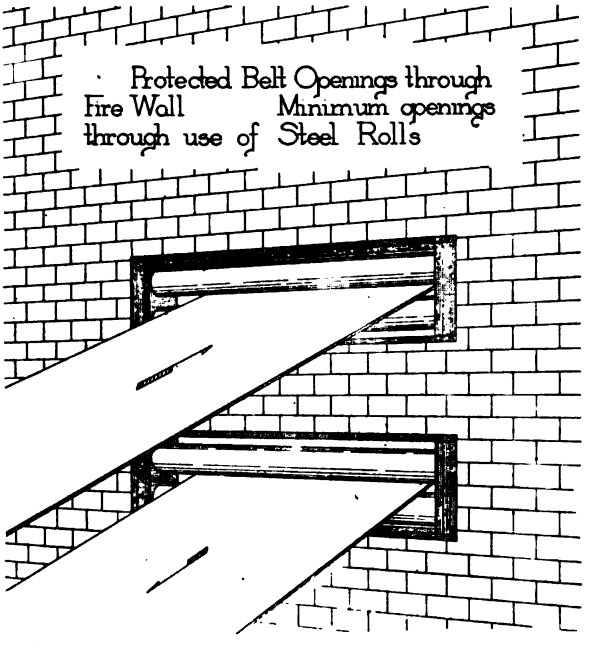

Fig. 7.

Complete and wholly admirable are the published rules for construction emanating from the National Board of Fire Underwriters; skill and technical knowledge has entered into their preparation to the extent that they are nearly, if not quite, beyond reach of adverse criticism.

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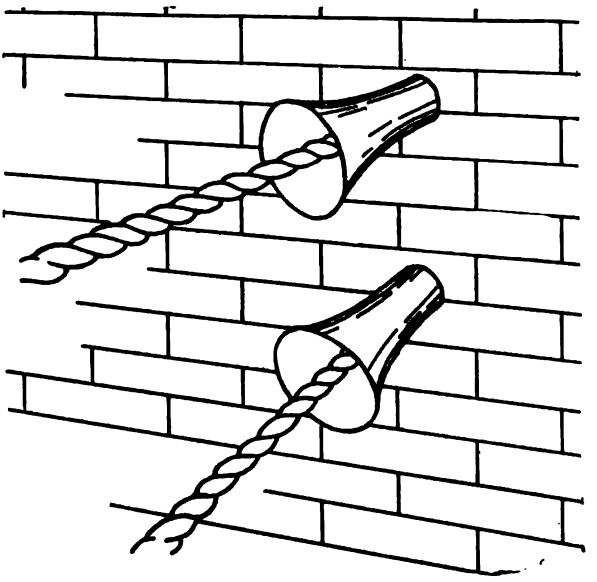

Fig. 8. Rope Passing Through Tubes

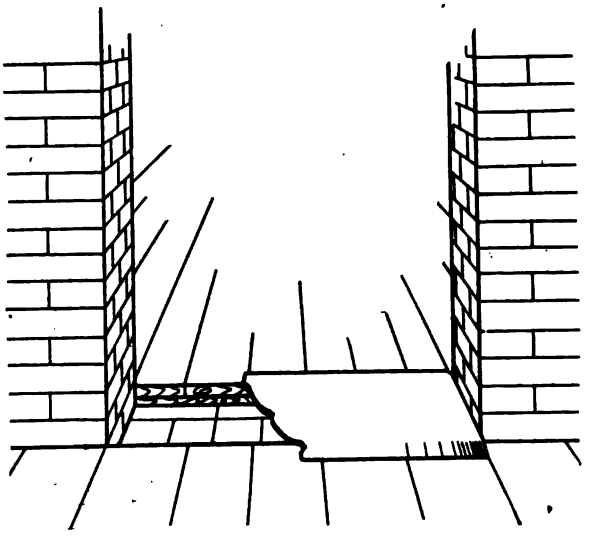

Fig. 9. Defective Threshold Construction

Apparently they carry their own explanations, and their accuracy is seemingly self evident, yet they do not always convince, and they do need explanation and supplementary argument at times, especially to those brought up in slightly different ways of thought.

STANDARDIZATION FAR OFF

Standardization in these matters is far distant as yet, and whether it be in Babylon or Sandy Creek Junction the same feeling will exist that for experts selected by these communities to frame and enforce regulations to accept entire a code framed by others would be in derogation of their dignity, and would in some manner be evading their responsibility. One instance will suffice.

An architect in good practice and sufficiently in repute was entrusted with the planning and supervision of a good-sized modern, completely fire-resistive structure. At least that was the intended construction, but the first examination of the completed building developed two large, vertical openings through all floors, entirely unprotected, and the various floors cut off from the main stairway and hall by thin paneled wooden doors in wood frames.

The architect's attitude was one of resentment; the city inspectors had passed the plans and accepted the building, and that was all he had to consider. What the N. F. P. A. or the National Board or the Institute of Architects might have to say was of no special interest, nor did he apparently feel inpelled to attempt the exercise of any reasoning powers that would carry him beyond the terms of a politically framed building ordinance, passed years ago and radically defective at the time of its passage.

If we follow in this direction from the unusual toward the usual, we encounter other somewhat related conditions, concerning which some explanation and some suggestion of remedies may be desirable.

PIPE HOLES THROUGH BRICK WALLS

It is, to say the least, not infrequently

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the case, where a small pipe is to pass through a brick wall, first to build the wall, if it is not already built, and then to send workmen to break a hole large enough sometimes for a wheelbarrow to pass through, nearly always of needlessly ample dimensions.

Fig. 4 illustrates how to avoid the trouble of locating the point of passage, since the hole can easily be made large enough to allow several feet of variation.

In a general way it is less the avoidance of exertion than lack of co-ordination or any special desire to work in harmony. The location of the pipe hole is usually completely determinable, but the man who knows it is not the man who makes the hole, and it usually seems easier to make a larger hole than ask for a definite location. This is not a good excuse, but it is the best there is, since there is no good one. In this instance the wrong way is likely to cost more than the right way.

In constructing a wall through which pipes are to pass, provision for such passage can be made practically without expense and with all conditions of safety observed. The simplest of these is to build in a piece of tile or iron pipe extending through the wall at the proper point, and just enough larger than the pipe to permit of free passage, say one-half inch larger in diameter; the other is to wrap a piece of pipe of the same diameter in several layers of paraffined paper and build it in, when it may be withdrawn if slightly heated and leave a smooth hole. In the first method a slight enlargement of the sleeve will permit the passage of ordinary fittings. If the wall is already built, ordinarily a clean, round hole can be cut by using

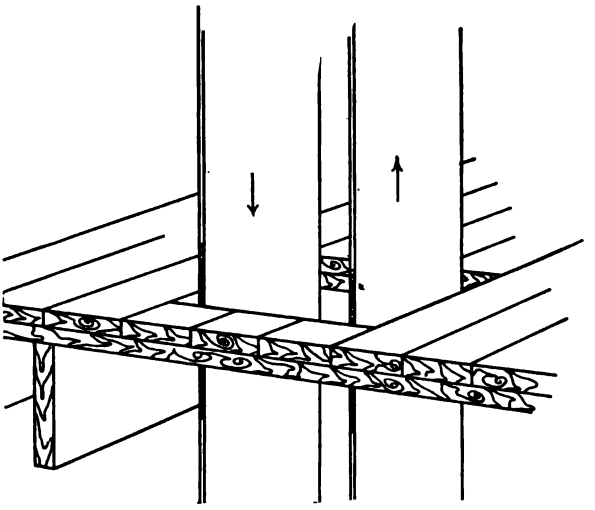
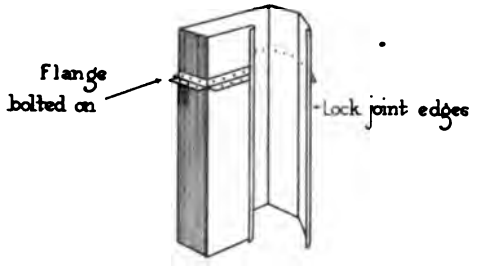
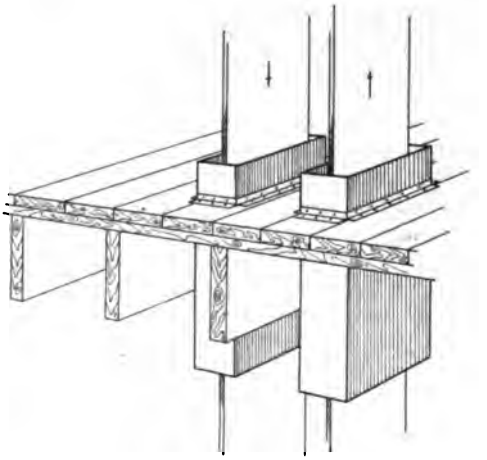


Fig. 10. Unprotected Belt Holes. A Common Defect



Detail of construction to spring about belt without disconnecting

Detail of edges



Galvanized Iron Belt Boxes

Fig. 11

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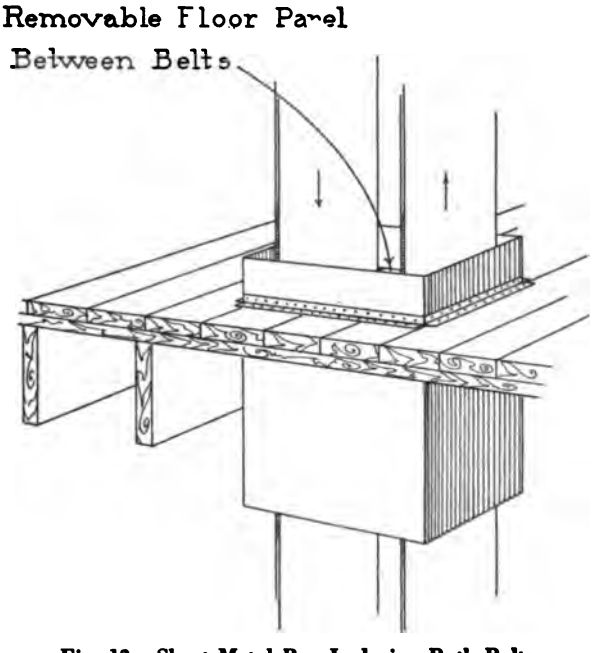

Fig. 12. Sheet Metal Box Inclosing Both Belts

notched gas pipe of proper diameter, without partly destroying the wall. Either way permits free movements and in either the space about the pipe can be lightly packed with asbestos wool or the like to prevent drafts.

The method shown in Fig. 5 of omitting enough bricks to leave an opening 2″ x 8″ or larger, while a little neater and a little less expensive, by no means meets the objection to needless room about the pipe for fire to pass through. Fig. 6 shows that it is just as easy or easier to leave a hole of the proper size as a larger one.

There is no force or value whatsoever in the objection advanced that expansion and contraction are insufficiently provided for, since the sleeve is always loose enough to take care of all movements in the long dimension and as to lateral or vertical movements there are many ways to care for them fully without destroying or impairing the protective feature of fire walls. In all of these cases it resolves itself into a mere choice of a better method at the expense of seemingly a little more time and trouble, often more apparent in anticipation than real. Flat contention that holes through fire walls do not impair the value is not unusual, but, though sometimes encountered, generally yields to reason.

BELT OPENINGS

Belt holes, on the other hand, especially if the belts are large, are provided in advance usually somewhat wider than the belt and quite a little higher than the diameter of the driving pulley, the entire interspace being open. This is practically the i n v a r i a b l e method, the reason being the sag and sway of the belt. The totally unprotected belt opening is familiar to everyone, and the fire hazard has been repeatedly pointed out and emphasized.

Specifications for automatic fire doors and for removable panels for these openings have been published in excellent detail and may be procured of any of the insurance organizations.

Another effective method is passing the belt over steel rolls set in the opening closing in the central space, since with the sag taken up it becomes needless.

Fig. 7, belt hole with rolls, shows how to reduce the opening to a minimum in size. This possesses some advantages over other methods, being equally operative whether the belt is moving or idle. The frame or box carrying the rolls affords an excellent location for a "ground" to take up any static electricity generated at the pulley, or fly wheel.

Rope drives can be handled by passing the ropes through metal tubes flaring somewhat at the ends to prevent cutting or catching of loose strands.

Fig. 8, tubes for rope drive, illustrates a method that is especially available where ropes pass through floors vertically. It is capable of adaption to drives of several ropes and reduces the area of the opening materially.

Taken altogether the variety of effective methods is so great that unprotected belt holes of this class seem generally inexcusable. In offering these suggestions

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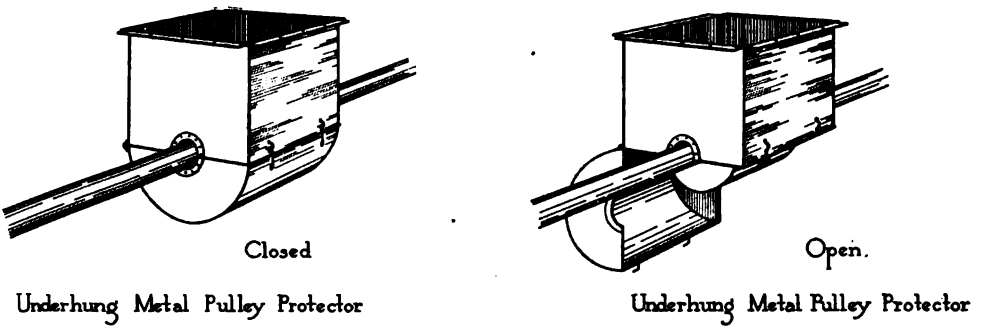

Underhung Metal Pulley Protector
Clutch operated from above

Underhung Metal Pulley Protector

Fig. 13.

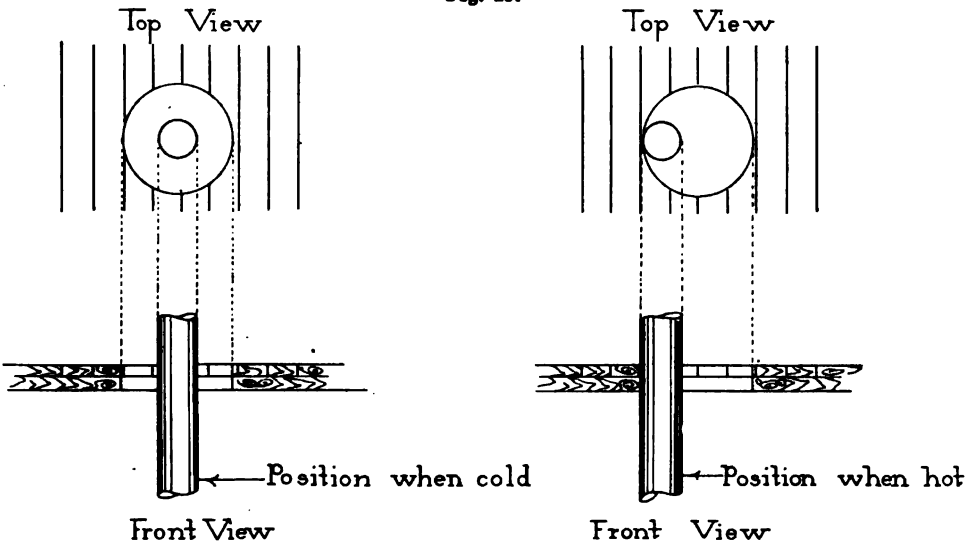

Fig. 14. Showing Change Due to Expansion

an effort has been made to confine them to those wholly practical and suited to all ordinary conditions, hence it seems quite fair to record a protest that (whether it is less trouble or not) a sufficient pipe or shaft hole does not necessarily imply one spaced to pull the engine through from one side or the transmission pullies from the other side, in case the shaft is to be taken down or the belt renewed.

A not uncommon defect might be noted before passing entirely from wall openings. This is one found especially in fire walls which are bearing walls for joists and mill timbering and the first floor layer runs parallel to the wall.

In these walls sometimes the top of the wall at the bottom of the door opening will be found about flush with the top of joists or timbers and on a level with bottom of floor boards. Over this is thrown a wrought iron plate bevelled at the edges and screwed to the floor boards.

If the floor boards fitted tightly to the wall there would normally be a space measuring the area of a horizontal section of the doorway and as high as the thickness of the floor boards, edges of boards, two sides, iron plate on top and brick below.

But boards shrink and walls settle, and usually if the iron be lifted it will be easy to see both sections at one time from above, and not infrequently there is room for a grown rat to pass from one to the other.

The failure (Fig. 9) to lay the final course of brick needed to bring the bot-

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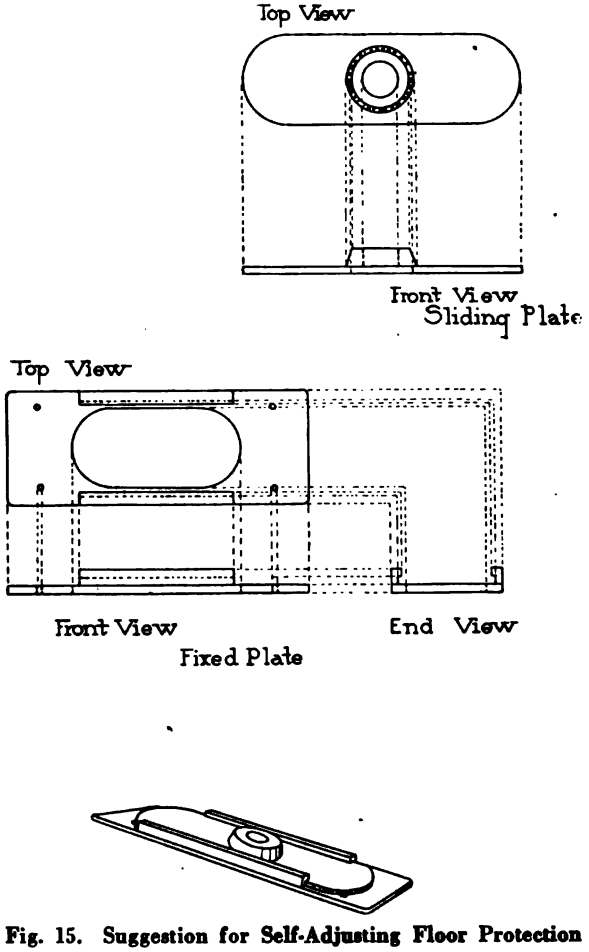

Fig. 15. Suggestion for Self-Adjusting Floor Protection

tom of the door opening flush with the top of the floor (a 4-inch floor requires two courses) is more frequent than is generally suspected and a good deal of a menace. It is just as foolish as the glass transom or the omitted wall. It is moreover fairly difficult of detection by superficial examination and may serve to explain some otherwise inexplicable failure of apparently good fire doors and walls.

The opening should in every case be built up with brick or cement flush with the top of the floor, and the iron plate bolted down to it in the door opening by at least 3 countersunk expansion bolts or their equivalent. The bevelled edges may also be screwed to the floor if desired, but the filling in and the bolting down are absolutely requisite.

BELT AND PIPE HOLES THROUGH FLOORS

So closely connected with the general subject is the matter of belt holes through floors that it seems best considered in direct connection.

In ultra-modern factories built with belt towers or for electric power this hazard is practically eliminated, but in the majority of cases it still remains.

Although belt holes are necessary every hole provides an upward draft and a means by which fire finds ready passage to the floor above, a fact apparently self-evident, yet of all fire facts most generally discredited, and the need of reducing these openings to the smallest practicable size denied. So general is this that in many classes a factory with well protected belt holes is an exception.

Not only does the draft carry up the fire (Fig. 10), but the flame drawn through forcibly at the opening and compressed in the process opens out upon passing and the "lap" of fire reaches all nearby loose material on the floor, at the same time igniting the edges of the opening.

Obviously the most than can be done and the least that should be done is to surround the belts with some incombustible protection which will serve to protect the edges of the floor, and is carried high enough to overcome the "lap" and permit passing flame to vent itself in mid air. Wood is not well adapted to this purpose. There appears to be no material better suited to it than galvanized iron. Of this material boxes can be made which will afford considerable protection and at little cost. Such boxes can be made in the sheet metal shop to pattern and sprung about the belts and into position without disconnecting or disturbing the belts.

Fig. 11 shows iron belt hole boxes. By reference to the cut it will be seen that small boxes may be cut from a single sheet, the edges turned over to protect

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the belt, a locking edge bent, the supporting angles riveted on, and the whole bent to shape ready to spring about the belt.

The boxes should extend about 6″ above the floor, and below the floor as far as the lower line of the joists (in case of hollow floors, to be carried entirely through) and up and down belts should pass through different holes and boxes, with the intervening space filled in, even if by a removable panel, as thick as the floor.

The boxes can be made to pass the floor at any desired angle, but should not usually be carried up any more above 6″ from the floor line than circumstances compel, never continuously from floor to floor.

The theory involves, minimization of draft; use of incombustible boxing; keeping points of flame expansion and concentration at ends of boxes a reasonable distance from floor, above and below an irreducible minimum area in openings.

Fig. 12 shows a double belt box.

It happens not infrequently that belts are so taken from pulleys below the floor that it is more convenient to close about the pulley than to box through.

Fig. 13 shows an underslung belt box. For situations where it can be conveniently installed this method affords a little better protection than the ordinary boxing. It is of special value where machinery prevents carrying the boxes the requisite 6 inches above the floor. Note method of bringing box to provide for opening it, for examination and cleaning.

SHAFT AND PIPE HOLES THROUGH FLOORS

Shaft and pipe holes through floors should invariably be bushed, the bushing in case of steam pipes to be elliptical, at least one inch greater in shorter diameter than the pipe, and in event of hollow floors to extend entirely through the floor. Such bushing may be merely tin tubes bent outwardly at top and bottom to hold them in place. The opening surrounding pipe should be protected at the top by a metal cap or loose flange ring. This applies to all steam pipes, heating or other, exhaust or live steam.

The current method of slipping a flange ring over the pipe and screwing it to the floor is not only unscientific but futile, since no screws can hold against the thrust of expansion, or if they do hold, it is because the collar breaks before the wood gives away. When steam pipes are set up cold and central in a circular opening, as soon as steam is turned on expansion of the lateral supply forces the pipe firmly against the wood, where it remains until cooled again, often, when the pressure is considerable, charring or burning its way for some distance into the floor boards.

Fig. 14 shows the position of pipe when set up cold and the final position of pipe when warm. There is only one possible apparent remedy for steam pipe contacts; that is an elliptical opening about 2½ to 3 times as long as wide, with a sliding collar to protect the opening. Models of exactly such a device were shown to the writer some years ago; they could, however, be made at near the cost of the collar plate now in use.

If fires from steam pipe contacts are to be much reduced in numbers something of this sort will have to be adapted, the plan to consist of

1. Elliptical openings, the pipe to be set up to permit of the fullest expansion.
2. Sliding collar plates for protection.
3. Complete bushing of opening, the bushing to be continuous through hollow floors.
4. Where designed to hold back water the sliding collar to be omitted, and the elliptical bushing to fit closely to floor and extend some inches above it.

The model of a form of floor plate designed to meet these conditions before alluded to is here reproduced as nearly as memory will permit it. It was never offered for patent or manufactured, although said to have been approved by several large builders.

Fig. 15 shows a floor protector for pipes. As will be seen this consisted of two parts, a floor plate and a sliding collar plate keeping the opening constantly covered, yet completely avoiding contact of floor boards and pipes. It would be practicable to cast each of these parts in two sections, in order to apply to pipes already in position.

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At any rate there was and is merit in the idea, and had the designer lived it might have been brought into use before this. It is correct in principle whether the form is the most practicable or not.

Certainly something of this sort is needed, and this is offered as something to build upon. It should, while costing a trifle more at installation, cost much less in the end, not only by freedom from breakage but by protecting the floor from charring and injury. Such floor plates once placed upon the market should meet with acceptance and be readily salable.

Illumination of Coal Mines

By Joseph J. Walsh

Inspector, Fourteenth Anthracite Inspection District, Nanticoke, Pa.

THE question of lights for use in a coal mine and the relation existing between the casualties and the kind of lamps used have received considerable attention during the past few years, particularly in gaseous mines. With all this, however, there is no reliable data by which a relation can be established between illumination and accidents.

There are four kinds of lamps in common use in the coal mines, namely, the open oil burning, the acetylene, the safety, and the electric. The first two mentioned are those chiefly used in non-gaseous mines, and it is felt that the illumination afforded by their use is sufficient to permit the miner to detect, within a reasonable degree, the border that marks the limit of ordinary prudence.

In gaseous mines, however, the laws of Pennsylvania require the use of safety lamps, of which there are many types. The style of lamp commonly used is so constructed that the admission of air to the flame and the escape of the gases produced by combustion must pass through a wire gauze. The standard gauze consists of 28 wires to the inch, or 784 opening per square inch, and by reason of the cooling effect produced by the wire gauze an inflammable gas may burn within the gauze, and under certain conditions will not ignite the gas in the surrounding atmosphere until the temperature of the gauze becomes such that it closely approaches the temperature of the burning gas. Ample warning is had, however, of this approach to danger.

Because of the low illuminating power of the various safety lamps, a portable electric cap lamp is now being introduced in the gaseous mines.

The advantage claimed for the electric lamp is found chiefly in its high illuminating power, and because of its construction there is no danger from gas ignition. In practice, however, it has been found that the lamp possesses a decided disadvantage, inasmuch as the presence of gas cannot be detected by its use. To overcome this objection some of the coal companies supply their miners with a safety lamp in connection with the electric lamp. It was found that this practice did not fully remove the objection to the use of this lamp in gaseous mines, because the miners in many cases failed to use their safety lamps, and as a result of their neglect deaths have occurred because of exposure to noxious gases.

To overcome the objection just described an effort is being made to construct an electric lamp in such a manner that it may be used for both illuminating and gas testing. This can be accomplished by taking advantage of a certain property possessed by platinum, namely, its ability to absorb certain gases, chiefly hydrogen, which constitutes a large part of methane, the principal mine gas.

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Die Construction—The Real Safety of Punch Press Work

By August L. Kaems

Assistant to Safety Engineer, Industrial Commission of Wisconsin

Proceedings of the Eighth Annual Safety Congress

PUNCH presses give the safety department of the Wisconsin Industrial Commission more trouble than any other machine in the metal trades, for the reason that the accidents are always serious.

In 1916, 27 per cent of all the accidents in the metal trades were caused by punch presses, and 48 per cent of all the serious accidents resulting in permanent disability in the metal trades were on punch presses.

I went into a large plant not long ago, in which 13 fingers had been lost during the first 6 months of the year. When I told the general superintendent that they had lost 13 fingers inside of 6 months, he said, "The hell we have!" Now that shows he did not know a thing about what occurred. The man who took care of the accidents saw that the injured man got proper medical attendance and when it was all over, the compensation was paid; if he was not able to work, on a punch press, other work was given him. It was not thought necessary to burden the general superintendent with little things like this. Let us suppose that instead of 13 fingers taken off, material had been spoiled amounting in dollars and cents to compensation paid for these 13 fingers, what would have happened? Would they have been able to get by with it? Why, no. Requisitions would have to be made out for new material and in the end it would have been necessary to come to the attention of the general superintendent that $5,000 or $6,000 worth of material had been wasted, and I am sure he would have been interested in knowing the cause for this waste of material.

I have in mind a plant where three hands were lost in 1918, and when the first hand was lost, I went to the plant and showed them how this work could be done in a safe way. I am sure it would not have cost more than $50 to have done this, but the superintendent in the department absolutely declared the man was to blame for the loss of his hand; that he would make this change, but the responsibility was on the man just the same. Only a short time later another report came in of a hand lost, and I went again. The superintendent again claimed the man was to blame for this second accident, for not attending to his work; that if he had, the accident would not have occurred. But they promised to change the work at once, and yet before it was done, the third hand was lost. It was then done, and the same accident cannot occur again. The superintendent also informed me that it had not decreased the output by a single piece.

Now let us stop and think. Suppose this man at one drop of the ram had spoiled $2,000 worth of material, and this had been brought to the attention of the general superintendent. When he called in his assistant and the foreman of the department, and they both told him that the man was careless and had been warned several times but had not heeded the warning, and for that reason had spoiled $2,000 worth of material, would he have shrugged his shoulders and said, "That is too bad!" Why, no. And if a few weeks later this same machine had spoiled $2,500 worth of material and again the superintendent and the foreman of the department had been called in and again informed the general superintendent that the man on the job was careless; that he had been warned to take care and that the man next to him had warned him to be careful or he'd

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spoil the material; but he had been careless, would the general superintendent have shrugged his shoulders and said, "That is too bad!" If he did, he would soon ruin the firm. If a few weeks later this same machine had spoiled $3,000 worth of material, would he again have said, "Too bad!"? Why, no; there would have been a houseclean ing long before that. All this material could have been replaced, but hands cannot be replaced because they are God-given.

HANDS AND FINGERS FIGURE IN OVERHEAD EXPENSES

I will tell you why some firms are not interested in fingers, hands, and even lives. Hands and fingers are figured in the overhead expense and do not cost the firm anything. The consumer pays this overhead expense. But material cannot be figured that way and for that reason, they are interested in material and not in fingers. The public who is paying for this has not grumbled over what it has cost, but some day it will awaken and demand that this work that they are paying for be done in a safe way.

SEALING UNSAFE MACHINERY

Several States have passed laws which authorize inspectors to go into the plants and seal dangerous machines so they cannot be used until they are made safe, and all will agree that punch presses should come in for their share of such sealing. Are we going to wait until that overtakes us in all States, or are we going ahead and do the things we should do? I say again that the heads of the firms must become interested and must begin to think how it must feel for one to be injured. Unless they can put themselves into that place, they cannot know. I am showing you the picture of a young boy 16 years of age who has lost his hand due to the fact that he was not properly instructed by the foreman, or to the fact that the machine was not properly guarded. How would you feel if that was your boy brought home? Let me show you a picture of a man who has lost his arm due to the fact that he was not properly instructed in his work, or that the machine was not properly guarded, and suppose it was yourself brought home to your family. Now, we men often think that we are the ones who are carrying the big load, but that is not true. It is the little woman at home who is taking care of the family all day, who sits up at night and nurses them when sick, that carries the big load, and then to have the breadwinner brought home crippled for life. How would you feel? That is exactly how these poor unfortunates feel when they are injured and their loss of limb or life may be directly charged to men higher up who have not yet become exponents of safety. I was in a hospital the other day when the nurse told me of a man who came in to have a finger dressed. When she saw his other hand she noticed that it was terribly crippled and she wondered how a man with such a hand could get in. I told her as I had told many a man before who had a crippled hand to keep his hand in his pocket while he looked for work, that this man kept his hand in his pocket while he looked for work knowing no one would hire him if it were seen. Not long ago I held a meeting in a small town at which a superintendent related how only a short time before he had hired a man and when the man came to work next morning, he noticed how badly crippled one of his hands were. The superintendent did not know what to do. He took a chance and allowed the man to work and found him to be a good mechanic and satisfactory in every respect. The superintendent stated, however, that if he had seen the man's hand, he positively would not have hired him.

Just think how you would feel if your hand was crippled through no fault of your own, and it would have to be hidden when you went to look for a job. How do you suppose such a man feels toward the society in which he lives?

Safety work is like religion. I do not care a snap for the man who goes to church regularly and then tries to get the best of his fellowmen; that is not religion; nor do I care a snap for the man who talks safety and does nothing. That is not safety.

Safety must be within you.

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Safety in Steel Erection

By Colonel E. A. Gibbs

The McClintic-Marshall Company, Pittsburgh

Proceedings of the Eighth Annual Safety Congress

STEEL erection presents in general the same problems regarding safety encountered in other field construction work. There are, however, certain differences between steel erection and general construction—the loads are generally much heavier and handled under more varying conditions at a greater distance from the ground. There is an element of risk in every lift. While the derrick may have been tested throughout and proven safe, an accident may be caused by a bridgeman making one careless hitch on a load of beams.

The first requirement for safety in erection is to have the proper equipment. Foremen and workmen cannot be expected to take the necessary precaution if they are not provided with proper equipment in first-class condition. And it is not enough to provide first-class equipment. It must be kept in good condition by constant attention on the job and by overhauling at the completion of the job if necessary.

Some of the principles observed by our company regarding equipment are:

1. Use no wooden travelers or derricks, except very light derricks and jinnywinks.

2. All castings in erection equipment carrying any strain to be made of steel. We make all of our sheaves for cable blocks, except small blocks for ⅝-inch cable, of steel. All castings when bending strains are encountered are made of vanadium steel. Vanadium insures a more uniform casting and tends to eliminate blow holes.

3. Forgings of importance such as the headblock of a derrick car are made of nickel steel.

4. Use the very best manila lines.

5. Use cable slings, instead of chains Very important.

6. Automatic brake in addition to mechanical brake on all electric hoists.

In the erection of ordinary work the equipment provided, if it is of the best quality, is amply strong for the purpose. It simply requires proper handling and reasonable care.

For the heavier classes of work, heavy and frequently special equipment must be used. This equipment requires good designing and the best materials. Good designing implies a thorough knowledge of how the equipment is to be used, and the provision for all reasonable uses to which it may be put. It is the duty of the foreman, after being properly instructed, to see that the equipment is put to no uses for which it was not intended unless necessary, and then only after proper investigation by an engineer.

Erection equipment should be so designed as to make all stresses as determinate as possible. Even then the many positions in which a load can and will be handled will produce more varied strains and conditions than occur in bridges or other permanently fixed structures. Be sure that all stresses and combinations of stresses are fully cared for. Then, not only make the main members strong enough but pay especial attention to details. Most failures in erection equipment are primarily due to poor details. Booms with light lacing or lacing improperly detailed are common. Poor detailing often produces very great bending stresses that are ignored.

Erection equipment should be most carefully inspected during its manufacture and test reports required for steel castings, all alloy metals and steel cables. The assembling and erection of a traveler or heavy derrick should be carefully done to insure that no stresses are introduced by improper alignment. This is extremely important. Booms and traveler hoists should be tested, with gradually increasing loads before using them to full capacity. While in use they should be inspected frequently to see

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that no weaknesses have developed through wear or other means, and that the equipment is working as designed.

Instructions should be issued as to just how equipment on heavy work is to be used and nothing left to chance. A movement of a very short distance in the setting of a traveler or in the radius of a heavy boom may be perfectly safe as far as the equipment itself is concerned, but may endanger the falsework or the permanent structure.

In the erection of falsework, great care and an accurate knowledge of conditions are necessary. Timber should be carefully inspected and none but of good quality used. In case mudsills are used, examine the soil carefully and provide sufficient mudsills to support the load with ample safety.

The matter of bracing the falsework bents themselves, their connection by bracing and struts, and the fastening of the end bents to the piers or abutments so as to prevent any longitudinal movement of falsework, are all points where too much care cannot be exercised.

Following are some cautions that if followed will prevent many of the accidents in steel erection:

1. Select the proper man for the particular task in hand.

2. Do not order men to work in unnecessarily dangerous places, and be on the alert to see that they do not run unnecessary risks of their own volition.

3. Do not allow the men to work on corrugated iron roofs or steel when there is a coating of ice thereon.

4. Walking on rods, riding loads or locomotive cranes, sliding down lines without inspecting the fastening, standing in the bight of a line or in front of a gate block, are all unnecessary risks and should not be permitted.

5. Do not permit men to work about crane runways without placing an effective stop between the men and the traveling crane, and see that the electric wires are properly insulated.

6. Require the rivet boss to inspect carefully all riveting scaffolds. Improperly hung scaffolds have caused many serious accidents. Only the best material should be employed. Clear spruce is the best.

7. Pipe used as needle beams should not be spliced.

8. All scaffold plank should have a stop bolt about 6 inches from each end to prevent it from slipping off the needle beam and if the scaffold is inclined it should have cleats nailed on the plank. All scaffold material should be tested for twice the load it is expected to carry. Even this care will not suffice unless the men are careful. This was demonstrated in a case where a riveting gang used their scaffold as a brace for an air buckup. The scaffold—amply strong for its purpose—broke under this sudden additional load and the men fell into the river.

9. On high bridge work, scaffolds should be provided with a railing. This is a requirement by law in some States.

10. Piling of material must be carefully watched, particularly with heavy work. Skide should be amply heavy and level, and the piles not top heavy. Poor piling of material is responsible for a large number of accidents.

11. When it is necessary for men to work above other men, put up a danger sign calling attention to the fact that men are working overhead.

12. Keeping small tools in condition will avoid many accidents.

13. Wearing of goggles while chipping is a necessary precaution but one the men dislike to follow.

14. In the use of cable slings, inspect them frequently and keep them properly oiled, and in handling heavy loads pad the sharp corners to prevent cutting the cable.

PREVENTABLE ACCIDENTS

They may be divided into three classes:

1. Accidents due to workmen themselves by reason of being physically incapacitated: ignorant, inexperienced, intemperate, careless or reckless, acting the fool, or actual disobedience.

2. Accidents due to foremen:

Improper selection of men placed in charge of work or doing the work.

Inadequate instruction to workmen.

Putting men or allowing them to go into dangerous places unnecessarily.

Lack of vigilance and orderliness on the work.

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Failure to investigate questions of safety made by workmen.

3. Accidents due to superiors: by reason of improper selection of foremen, safeguards, equipment for doing the work and instructions regarding its use.

It is believed that the greatest difficulty is with the men themselves. Construction companies long ago recognized the necessity of having proper equipment, and that phase of the situation is in relatively good shape.

Hazards of the Cement Stock House

By Russell Frame

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Proceedings of the Eighth Annual Safety Congress

A STUDY of the causes of personal injuries in connection with cement manufacturing will disclose that the screw conveyor and sliding materials are always among the leading hazards. The stock house and packing departments having such a large proportion of these risks together with other dangers are worthy of careful consideration.

Taking the experience of the Alpha Company at eight stock houses and six packing rooms, during a period from January 1, 1918, through July 31, 1919, they furnish about 8 per cent of the total injured, the same percentage as to total days lost, and the only fatality on our records during the years of 1917 and 1918. Half of the men injured were compelled to go off duty. This runs close to the general average from the studies of the Association.

BINMAN'S FATAL ACCIDENT

With reference to the fatal accident, the employe (a foreigner) had been in our service over two years and was following his regular occupation as binman in a small stockhouse in which the cement was stored on the bin plan. The employe was directed to do his work in Bins No. 5 and No. 6, each one having a capacity of 4,800 barrels. This certain afternoon there remained 400 barrels in each bin which had to be hoed in feeding the cement to the screw conveyor. After loading one car of cement the foreman failed to receive an answer to his signal and upon investigation found that the deceased, instead of working in Bins No. 5 and No. 6, had gone over to Bin No. 3, where he could secure the required cement with far less real work on his part as compared with the hoeing he would have to do in the former bins. His portable light he left hanging in Bin No. 5. Working on a contract basis we think caused him to change from an almost empty bin to a full bin where he could have less wearisome working conditions, and his further neglect to afford himself ample light contributed to the recklessness resulting in his death.

HAZARDS OF STOCK HOUSES

Cement stored in bins presents greater danger to the workmen during the course of its removal than is usually found in the open house.

At Martins Creek we have two types of stock houses. No. 1 has been partitioned off in bins where a known quantity of cement can be stored for special orders, tested and sealed, and to be drawn during the presence of the inspector who is sent to the plant to see that the cement in his shipment comes from this particular bin. The capacity of the bins is as follows:

1 bin, 10,000 barrels.
1 bin, 6,000 barrels.
2 bins, 5,400 barrels (each).
1 bin, 4,000 barrels.
1 bin, 2,300 barrels.

and the remainder of the bins each holding 2,600 barrels.

No. 2 stock house is 270 feet long, 73 feet wide, and the walls are 39 feet, 6

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inches high. The capacity is 185,000 barrels. There are no bins such as described in Stock House No. 1, the cement being discharged at different points from the overhead screw conveyor and left to follow its natural course as it strikes below. This has been termed as "open stock house."

The storage bin has a limited capacity, and while being emptied the cement tends to cling to the surface of the partitions and, therefore, gives the working face a steep pitch. When the cement is being disturbed to cause a flow, the workman must be on his guard in event of abrupt and heavy slides of material, which are very often the rule. The space in which the man can safely do this work is limited, the bin may not have adequate natural or artificial lighting, the flow of cement creates a continuous dust, the man will have his entire lower limbs wrapped up with cement sacks that retard quick movement—all of which increase the chances of injury. In case a man is covered up by cement it takes only a few moments for him to smother to death.

In an open stock house having tunnels the conveyors in which are fed by spouts and arranged at short distances apart, the cement that does not flow to the opening freely will remain in small low piles in the stock house. Men have plenty of room, more light and better ventilation during the course of hoeing the cement.

When walking over the top of cement in an open stock house during the course of taking an inventory, care must be exercised against starting a slide. At one of our plants a finishing mill foreman, appreciating this danger, has been known to follow the chemist in the course of this inventory without the knowledge of the latter, so that he might be close at hand in case of accident.

Sometimes we find a small leak in the stock house roof or sidewalls, through which moisture will penetrate and reach the cement when the storage is well filled. In cleaning the last cement from the stock house, there is a danger from any cement which has hardened sufficiently to hold fast to roof supports, to other overhead construction and to the sidewalls. At Plant No. 6 a formation which was clinging to the eave of roof fell and struck the binman across the back, causing a disability of 70 days' duration. Another man was injured in removing hard cement from the stock house sidewall.

DEEP-WELL BLASTING

In 1914 the association received a report of a man being killed by a slide of cement caused by jar from the railroad. This brings to mind another source—the deep-well blast in the quarry. Every man should be ordered from the stock house during such blasting. Our experience shows that slides are induced by the accompanying jar. Particular care should be observed when working in freshly-ground cement, as it is known to move quickly and in heavy slides upon disturbance.

During the course of the removal of cement, the safe practice is to work not less than two men at any one time; to furnish a long rod and long handled hoe to start the cement, ropes where conditions permit their use, and careful instruction to men as to the danger should they undercut the cement to induce slides, together with a rule that hoeing should be begun from the top of the pile and the cement worked on the terrace plan. Compressed air is a good agency to start a flow of cement from a bin. The floor of the stock house between the tunnels, when constructed on an angle, will induce a greater free flow of cement.

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Industrial Health Hazards

By Dr. Charles A. Lauffer

Medical Director, Westinghouse Electric & Manufacturing Company, East Pittsburgh

Proceedings of the Eighth Annual Safety Congress

MODERN industrial developments, collecting vast multitudes of men and women in industrial establishments, bring to the forefront the problem of health hazards. The vast exodus from rural to urban life during the past generation, forcing into indoor occupation individuals whose ancestors for generations lived out of doors, has further emphasized the problem of health hazards.

INDUSTRIAL HEALTH HAZARDS OF EMPLOYES

The industrial health hazards of the employes may be grouped as arising from:

1. Poisons, dust, fumes, gases.
2. Heat, humidity, ventilation.
3. Lighting.
4. Crowding.
5. Fire peril.
6. Association with diseased employes.

The Harvard Chart gives a readily accessible grouping of the industrial poisons; a consideration of all of them would be out of place in this connection. Lead, arsenic and mercury cause definite toxic effects, when absorbed by workers in these metals. The most used poison is lead. Not every employe who handles a paint brush, however, gets lead colic; some paints are innocent of lead, yet employes who have never touched lead will bring in diagnoses of "lead poisoning," merely because an attending physician knows they are painters. Lead storage in the tissues may ensue when lead is carelessly handled, yet lead poisoning is practically unknown in large plants handling hundreds of tons of lead every year. The extent of industrial lead poisoning, we know, is much less than some reports would have us believe.

Employes who cannot be taught to wash their hands before eating, and who never clean their finger nails, nor care for their teeth, are particularly liable to lead poisoning. Lead cannot be eaten with immunity, within or without the industries, but with individual co-operation, plus careful industrial supervision, the lead hazard can be mitigated. Precautions in handling lead reduce, almost remove, the health hazard from this source. Individuals who have once developed toxic lead symptoms should be given other employment, as the poison is accumulative, and is never entirely eliminated, hence relapses readily occur, making permanent transfers to other lines of work necessary.

Persons having a tendency to eczema, or furunculosis, may develop a skin rash from the solvents employed in removing varnish, shellac and various insulation dope. Cutting oils, recovered by centrifuge methods, provokes skin infections; forced filtration through successive layers of filter paper removes minute metallic spicules, and filters out bacterial flora that affect the skin. Cutting compounds are often culture media for pathogenic bacteria, and may require sterilization—by heat, chemical and filtration methods. Minute burns from flying hot chips; abrasions by metallic spicules in dirty cotton waste—used in rubbing hands and arms—rough scrub brushes or caustic soaps may provoke such dermatitis.

Every industry has its own problem, or succession of problems, in this line. Persons manifesting such susceptibility should be transferred to other lines of work, some individuals can work in chemicals for months without developing trade dermatoses, while others develop such trouble quickly. When 150 employes are subjected to the identical exposure, and only three develop industrial dermatoses, the factor of personal susceptibility is suggested. At-

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tention to the toilet—thorough, careful cleansing of the skin—tends to reduce industrial dermatoses.

Dust and fumes are drawn out of their source, in the well-equipped modern factory, so that the factory atmosphere is, or can be made, relatively clean. There are justifiable grounds for pride where a wholesome factory atmosphere is maintained. The competition between factories to make working conditions the best possible has not yet been over-worked and can be promoted to the mutual advantage of both employe and employer. It is up to the initiative of employers, co-operating with architects, ventilating, heating and lighting engineers, and employes' committees, to make working conditions safe from the health standpoint.

Pulmonary tuberculosis should be mentioned in its relation to dust and fumes. Dusts in themselves are not infectious. Dusty air is not salubrious, but with the dust evil minimized, as in modern industries, there are few occupations that can be condemned as unfit for healthy men.

We are told that guinea pigs kept in cement mills develop no calcicosis, and employes seldom do. While the controversy over cement dust still rages, its dangers are less excessive than some have imagined. The dust menace in other trades is, in comparison, relatively negligible. Coal miners develop more or less anthracosis; iron workers may develop siderosis. Marble cutters formerly developed calcicosis, which health hazard is now much reduced by suction devices for the removal of dust at its source. The inhalation of foreign particles—such as coal, iron, stone, textile fibers, animal hairs and furs, grain dust —gives rise to pigmentation of the lungs. This pigmentation in itself is of no consequence and everybody has it to some extent.

Dusts are most filtered out in the nose; if the dusts reach the bronchial tubes, they are caught in the bronchial cellular cilia and coughed up, being expectorated with the bronchial secretions. It is contended that none of the dust reaches the alveoli. Particles that reach the peribronchial lymph-nodes and the mediastinal lymph-nodes penetrate through lymph channels from the bronchi.

TUBERCULOSIS

Tuberculous individuals often gravitate to industries where the jobs are light, and the work within their ability. In the quiescent stage of their diseases these men should be employed. Moreover, many employes work indoors that should work outdoors. The high incident of pulmonary tuberculosis attributed to certain industries requires appreciative consideration, as an industry is scarcely responsible for an injudicious choice of occupation on the part of the employe suffering from or predisposed to pulmonary tuberculosis.

Tuberculosis is a house disease; indoor life is largely responsible. It cannot be fairly classed as a trade disease. The purely industrial diseases are but a fraction of a per cent of the sum total of industrial morbidity; they are but a drop in the bucket. The preventable diseases, non-industrial in source, loom large in comparison. Teeth and tonsils, "Coughs" and "colds," moreover, are times as much sickness in the general industries as do the industrial poisons.

The segregation and isolation of persons with "colds" is considered good practice, as "colds" are "catching." "Coughs" and "colds," moreover, are communicated by crowding together in factories, and susceptibility to such infections is heightened by poor ventilation, drafts, overheating, neglect of humidity control. These problems of engineering, successfully solved, make the factory atmosphere safe and minister to the health and comfort of all parties concerned.

INDUSTRIAL HEALTH HAZARDS OF EMPLOYERS

The industrial health hazards of the employers may be grouped as:

1. Decreased production; machines lie idle; sick employes are irregular, discouraged, lack "pep."

2. Excessive labor turnover, due to ill health, unfitness for jobs assigned, prevalence of epidemic and infectious diseases.

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3. Increased accident compensation expenditures, due to sickness masquerading as injuries. Cases arise daily where conditions are pathological, but trauma is alleged; or in which a minor trauma has provoked a prolonged period of disability or an unusual degree of permanent impairment follows injuries, not in consequence of the gravity of the injury, but owing to intercurrent disease, or the previously impaired vitality of the traumatized individual.

The government employs only healthy men for the fighting line, whose ability to recover from wounds is 100 per cent plus. The industries necessarily employ many aged and feeble men, suffering from latent diseases and infirmities, having enfeebled powers of resistance, and incurring delayed recoveries when injured. The industries are consequently entitled to sympathetic consideration in the vast economic problem evoked by injury plus sickness. A term of disability may start as an industrial accident, the trauma being admitted, yet the period of disability is prolonged indefinitely by complicating sickness, due to latent disease, activated by the trauma, or is prolonged by sickness arising from other causes, or from pre-existing diseases, unrelated to the trauma sustained. Fully "fifty-seven varieties" of sickness are presented as industrial accidents in entering compensation claims. Among these may be mentioned tuberculosis, syphilis—in various disguises, rheumatism—teeth, tonsils, gonorrhoea—each contributing its quota. These latent diseases and others are readily activated by trauma.

REMEDIES SUGGESTED

Since these health hazards face the industrial manager, what can be done about it? How can they be avoided? Measures to this end are:

1. *Industrial Health Clinics,* group diagnosis; health service measures; repairing defects; reclaiming those disabled by diseases, as well as those crippled, and fitting them into selected positions in the industries; health education.

2. *Legalized releases for defects that cause abnormally long periods of accident disability.* Hernia, varicocele, varicose veins, healed tubercular foci in joints, lungs, etc., valvular heart defects, eye defects, amputations, etc., should be charted, and an employer not made financially responsible for defects and diseases arising from causes unrelated to the employment, nor for aggravations of the same.

3. *Obligatory Post Mortems.* When the cause of death is in dispute, the report of the post mortem should terminate the controversy. So many deaths occurring from pathological causes, but reported as arising from accidental injuries received in the course of employment make post mortems essential, if justice is to be done all parties.

4. *Federal Health Charts.* Transient employes lose a day undergoing the physical examination that precedes their employment. A Federal health chart, renewed annually, valid everywhere, would be invaluable for the transient worker, as well as for the continuous worker, who remains loyally by his employer year after year. The onus of the physical examination should be removed from the industries. Proper placement in industry requires the truth about physical defects. The truth concealed works the greatest health hazard to the prospective employe.

An annual health inspection by the staff of a diagnostic clinic for every citizen between 18 and 55 could be achieved under Federal supervision. The surgeon general's office could establish in every community a Federal "good health" station, emphasizing diagnosis, and could recommend such remediable measures as the health maintenance of every citizen of draft age requires, both for industrial service and for war. The early correction of defects is desirable; the early recognition of incipient diseases leads to successful treatment.

Annual re-examinations would constitute a splendid follow-up system, to ascertain whether recommendations made as to teeth, tonsils, hernia, varicocele, etc.; diet, exercise, etc.; had been followed out.

Nation-wide Federal health service, devoting its energies to diagnosis would not interfere with existing agencies for the treatment of medical and surgical cases, hence would not in any manner

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antagonize practitioners of medicine, existing sanitaria and hospitals. A Federal educational propaganda for good health, however, could rapidly reduce the percentage of remediable defectives in the Nation by thus recommending and so arousing public opinion as to enforce remediable measures in the incipient stages of defects and disabilities.

Federal health charts, with photos, finger prints and complete data of physical findings would aid employment agents in rapidly placing men in the industries so that they would stay placed; health charts would not debar worthy men from the industries, but would facilitate in so placing them that their defects and morbid tendencies would militate least against them.

The proposed health charts could be the means of tabulating the availability of men for military service, hence would serve the exigencies of war preparedness, when men of draft age are again called out; they would likewise serve the industrial purposes of peace.

Dangers in the Dyestuff Industry

By Dr. L. C. Cone

National Aniline & Chemical Company, Buffalo

Proceedings of the Eighth Annual Safety Congress

THE greatest risks of explosions about dyestuff plants are three in number. Explosions of dyes and intermediates, explosion of pressure kettles, and explosions of vapors mixed with air.

DYES AND INTERMEDIATES

The type of explosion which has caused our greatest loss is the explosion of dyes themselves. We have been prone to forget that dyes are organic compounds, some of them closely related to explosives. We have not accustomed ourselves to consider each new dye as a possible explosive, but have gone ahead, powdering and grinding our products in blissful ignorance until an accident has called our attention to the danger.

A dye widely used for khaki shades on wool during the war was known as chrome yellow. This was made in very large quantities, dried, ground, packed and shipped. It is doubtful if a single producer of this dye tested this material for its explosive properties before he began to produce it on a commercial scale, yet, as I can quickly demonstrate to you by igniting a small portion of the dye, its quick burning properties render it more dangerous than many of our violent explosives. It is further doubtful if a single producer of this dye escaped the penalties of his failure to test the product. One large producer informed me that the total profits from the company's manufacture of this dye had been lost through disastrous fires and accidents.

The same thing is true of another widely used chrome dye, which is frequently known as metachrome brown. This product has been the cause of at least three disastrous explosions in different companies to my own knowledge. With these experiences in mind we shall be very remiss in our duties if we do not examine every new dye for its explosive properties. A general rule, well known to chemists who have dealt with explosives, indicates what classes of dyes are apt to develop explosive characteristics. This rule may be summed up very roughly as follows: "Be extremely critical towards dyes which are to be handled in the form of dry powders unless they are well supplied with sulphonic acid groups."

Even after the dye is given a clean bill of health by the chemist because of its composition, it would not be remiss to have the dye tested before drying and powdering. This is a service which the dye producers owe to their consumers

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as well as to their employes, for many dyes are mixed in mills and exposed to conditions which might, in a sensitive product, produce explosions.

PRESSURE KETTLES

With this danger of dye explosion eliminated, the next explosion risk which the chemical industry faces is that of pressure kettles. Chemistry at high pressure has only begun its development in this country. Processes which have normally been considered impossible are gradually being carried out under conditions of high pressure. The best illustration of this is the Haber synthesis of ammonia from nitrogen and hydrogen. This reaction will not take place between the two gases under atmospheric pressure, but when the two gases are brought together at very high pressure in the presence of a catalyst at elevated temperature, the two unite to a certain extent to form ammonia. With the growth of our American chemical industry, reactions of this type will be more and more largely introduced into our manufacturing plants. As they are introduced, the explosion hazard will become greater and greater, and the safety men must co-operate closely with the technical engineers to see that every possible precaution is taken against disastrous results to our workmen and to our plants.

It has been rumored that the very important intermediate, paranitraniline, has been made commercially by only one process in this country because another process, which offers many advantages, has a great explosive risk connected with it owing to very high pressure. If the American dyestuff industry is to be permanently successful, it must not permit itself to be restrained because of high pressure explosion risks. The control of this risk is primarily, of course, a technical engineering problem, but after the engineering lay-out is complete the safety man will find his opportunity to provide such appliances and such conditions as will give minimum destruction to life and property in case the engineering equipment ever fails.

VAPOR MIXED WITH AIR

The risks of explosion due to the ignition of mixtures and combustible vapors with air are already thoroughly appreciated by the technical and safety men. I only wish to call attention to the fundamental principles which must be followed in safety precautions to avoid explosions of this kind. While every effort to keep flames away from inflammable mixtures is commendable, these precautions alone will never entirely prevent ignition of explosive mixtures. Every effort must be concentrated on preventing the formation of such mixtures.

Many disastrous explosions have occurred where every precaution has been taken to avoid the presence of all sources of fire. It is never possible to entirely do away with the chance formation of either frictional or electrical sparks. These are apt to be formed at most unexpected times, and at these times, if an explosive mixture of air and vapor is present, an unexplained disaster results. One of the most disastrous explosions I have ever witnessed, in which a large and well equipped plant was completely destroyed, was due to a chance frictional sparks I will cite a case of my own effort had been made to avoid the proximity of flames to the combustible material, but a few simple precautions to prevent the formation of explosive mixtures had been overlooked.

As an illustration of the extreme difficulty of preventing ignition by chance sparks I will cite a case of my own observation where a large amount of toluene was stored in a glass enameled steel tank. It never occurred to the operators that a glass enameled steel tank is an ideal electrical condenser. The contents of the tank were not grounded in any way. A leak of toluene from the bottom valve soaked the floor under the tank; the workman in attempting to repair this leak made connection between the contents of the tank and the floor through a wire in his hand, the toluene on the floor immediately became ignited. Quick-witted workmen threw a few shovels of snow, which happened to be convenient, over the burning toluene and succeeded in smothering the flames before it ignited the tank. All of the conditions for a disaster were there present. An exam-

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ination of the conditions surrounding this flare caused us immediately to ground the contents of each storage tank through a large sized copper wire.

CO-OPERATION AND STUDY

For handling problems of this kind the safety engineer must have a very clear appreciation of the fundamental principles of both physics and chemistry, and must further work in close touch with the technical men of his own organization. By such close co-operation and careful study of each accident that occurs it will be gradually possible to eliminate the explosion risks of our industry.

Safety Education in Textile Industry

By William S. Ide

S. Slater & Sons, Inc., Webster, Mass.

Proceedings of the Eighth Annual Safety Congress

OUR overseers get together for a smoke talk occasionally, at which time we have some one present from out of town who can give a short informal talk on safety. At these meetings each one is asked to contribute his ideas and to ask questions.

These meetings are profitable, we believe, in that they tend to get the men better acquainted with each other and with the management. Furthermore each overseer is made to feel that safety work is just as much a part of his work as production.

COST OF ACCIDENTS

We tell our overseers that every lost-time accident costs the corporation $100 or more, $70 insurance charge (which I believe is the experience rating basis) and $30 for the loss of production, etc. Really, money talks and no overseer cares to see his department lose a hundred very often, particularly when he knows that records for each department are being carefully kept and from time to time will be read at the general meetings.

Our nurses and doctors are impressed with the cost of lost-time accidents, not only to the corporation but to the injured, and are requested that when an employe is so injured as to incapacitate him from his regular duties, but not from some other useful work, to advise him to return to work, when his overseer will give him something he can do.

We believe this policy is best for the employe for several reasons, because he loses no pay, by being occupied he suffers less from his injuries, and gets back on his regular work at the earlist possible moment.

The corporation benefits by not having the accident charged against it and has gone some way toward making the employe feel that a personal interest is being taken in him. All of this accrues naturally to the advantage of employer and employe.

The safety organization must deal with accidents very much as the health authorities deal with contagious diseases; the origin must be discovered and some definite steps taken to prevent further cases.

There are some cases that seem absolutely hopeless. We have in mind one man in particular, a very good workman, steady and sober, but always getting hurt; we finally had to release him as too heavy a risk.

RESULTS OF SAFETY WORK

During the six months previous to starting safety work there were 107 lost-time accidents, an average of more than 4 per week; for the first 6 months after safety work started there were 53 lost-time accidents, or an average of 2 per week, and the doctor who had most of our accident work began to revise his estimate of what his income tax would be.

During the 6 months ending June 30,

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1919, or the second 6 months of safety work, the lost-time accidents totaled 32, or not quite 1¼ per week.

Our lost-time accidents for 1919 to date, figured on a yearly basis are 2.24 per cent of the total employes, and we have every confidence that this figure will be cut in two, one year hence.

IMPORTANCE OF RECORDS

For the purpose of knowing just how progress is being made from every standpoint, accurate record must be kept of all accidents and their cost. This data should then be summarized and comparisons drawn, and the facts as developed brought to the attention of the safety organizations.

Such reports as are posted through the mail should be simple statements of the number of accidents each week occurring in the different departments or mills.

The principal factors in making safety work successful are the same as in making a success of any other work; you must believe in it, you must get everyone else to believe in it, you must put a lot of enthusiasm in it, and you must keep everlastingly after it. Nowhere can the maxim, "eternal vigilance is the price of safety," be applied with greater force or effectiveness than in a large modern industrial establishment, such as S. Slater & Sons, Inc., where the exercise of continual caution with manual skill means a high degree of productive efficiency, and where, on the other hand, carelessness of employes, with lack of alertness on the part of supervisors or foremen in the matter of preventable accidents, may mean heavy loss to both employer and employe in money and morale.

Danger Signs in a Paper Mill

By G. W. Dickson

Riordon Pulp & Paper Company, Hawkesbury, Ont.

Proceedings of the Eighth Annual Safety Congress

THERE are certain danger points where it is impossible to have a policeman continuously on duty with a club, and it is equally impossible to have a safety inspector on duty 24 hours a day. In such places we must rely on signs, and, instead of impressing the instructions with a policeman's club, the sign must be sufficiently striking and conspicuous to attain this end.

In regard to the language in which the sign is written—it is, no doubt, the effort of the people of the North American continent to make English our universal language. However, many foreign workmen are not familiar with it, and it is while they are still new to their surroundings that they are in greatest danger. In most cases a sign in two languages besides English should be sufficient in any one mill.

STANDARD COLORS OR DESIGNS

To further express the meaning of a danger sign it should embody certain standard colors or designs to express that idea. This plan has been wonderfully perfected in railroad signals, for instance. A switch-light or a semaphore arm describes conditions at its location by means of color, position, pattern or a combination of these, without a single word of explanation being printed upon them. So should our danger signs convey a meaning, even if the observer cannot read, or does not understand the language in which the sign is written. For instance, fire equipment signs might be lettered in white on a bright red ground, danger points indicated by a recognized emblem in red and another emblem referring especially to electrical hazards. For cautionary signs, yellow has been largely adopted. Hospital and first aid equipment may be indicated by a green cross. There are certain restrictions as to the use of the red cross, so it is well to be familiar with them before

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adopting this sign. Ordinary signs or notices giving such information as "Office," "Stores," "Exit," etc., may be carried out in white letters on a blue ground.

By adopting some such standards as these we are but carrying out the same idea as is used in advertising. Many a successful business is built up about a striking design or slogan. It is identified with the product and advertised in every magazine that you pick up. It makes no conscious effect on us when we see it, so we think, but when we need a certain article the advertisement of a certain brand immediately presents itself to our minds. Whatever be the psychology of this, let us apply it to our danger signs. Every day we may pass a red sign lettered in white, "Fire Hose" or "Hydrant." Now if our danger sign system is correct, the first thing you will do when you hear the fire alarm will be to "beat it" for that sign. The color or design of that sign was impressing itself on your sub-conscious mind every time you walked past it. So, I would say keep to standards, have a design or a color or both to express one idea.

FOR EMPLOYER'S PROTECTION

There is another class of sign to be considered—the ones placed for the employer's protection. Take two examples, a railroad right-of-way is generally protected at crossings by a "No Trespassing" sign. Or again, there is a sign mounted on a certain machine "It is forbidden to oil this machine or to throw belts on or off while it is in motion." Now there always will be a certain group of venturesome citizens, and they are usually of an energetic disposition, who conclude that these signs are out of date and the methods recommended are too slow. They are willing to take a chance, generally realizing that they are taking the full responsibility on their own shoulders. Unless we are prepared to carry out the above signs to the letter, that is, fine or imprison trespassers on the railroad track, and discharge the man who oils his machine while it is running, might we not better put these signs in more truthful form? We might say, "All persons walking on the railroad property do so entirely at their own risk." And the same thing might be addressed to the machine operator—he is doing it entirely at his own risk.

Another group of danger signs are only displayed at certain times. When a man goes into a boiler for repairs he hangs a "Danger, Man in Boiler" sign on the steam and blow-off-valves. A lineman goes to work on a circuit protecting himself with a "Danger, Working on Line" sign hung on the open switch. This should be warning enough to fellow-employes of ordinary intelligence, but the protection may be made complete by locking the valve or switch with a padlock and chain.

As to the materials used for danger signs—it seldom pays to paint a few words on a piece of tin or on a board. Permanent signs, enamelled on steel plate, are a good investment. They can always be cleaned to look like new, and are more likely to attract attention than a faded, poorly lettered, home-made sign. Makers now carry signs in stock with almost any wording and in almost any language, so that it is seldom necessary to go to the expense of having special signs made up.

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Electric Railway Hazards

By R. E. McDougall

Claim Agent, New York State Railways, Rochester

Proceedings of the Eighth Annual Safety Congress

THE accidents that the public (not including patrons) are involved in come within the following classifications:

(1) Pedestrians struck by cars.

(2) Pedestrians falling into excavations, over defective track, material left in street, hit by falling poles and wires.

(3) Occupants of vehicles in collision with cars.

(1) Many of the individuals struck by cars are children playing in streets, and their injury is due to thoughtlessness more than anything else. They will chase a ball onto car tracks without a thought of a car; they will catch a ride on the rear of a wagon or truck and drop off in front of an approaching car; they will ride a sled or a bicycle down an incline across tracks, never giving a thought to the possibility of injury. Their elders also get hit for the same reason. They do not think, and rely on others to look out for their safety. Intoxication is quite a factor in this type of accident, particularly on interurban lines.

While the motormen at times are responsible for injuries to pedestrains, the majority of them are chargeable to the injured party. They could be avoided generally by the use of a little judgment or common sense. Some individuals will hurry to cross ahead of a car and then stop and watch it go by, they will step from the curb between two automobiles or pass behind one car directly into the side or in front of one going in the opposite direction.

(2) Most accidents under this head are caused by employes leaving materials and excavations improperly guarded and lighted. Fortunately at the present time most municipalities have ordinances requiring proper guarding and lighting, and in the event of neglect or oversight on the part of employes their attention is soon called to it by the police.

(3) The increase in the number of motor vehicles in the past few years has resulted in an enormous increase in accidents between them and electric railway cars, and a long list of killed and injured. The most serious occur at grade crossings familiar to the auto drivers and with every opportunity to see and know of the approaching car or train traveling at high speed. Early this summer in a 3 weeks period, 15 people were killed in 3 accidents of this type, within a radius of 50 miles of Rochester. One car was being driven by a girl of 17 who was learning to operate the machine, one was being driven by a boy of 14, and the third was driven by a man who could see an express train approaching him at right angles and deliberately tried to beat the train to the crossing. Notwithstanding the fact that you read of this kind of fatality in every paper you pick up, it seems to and will continue as long as high powered automobiles are permitted to be operated by irresponsible or reckless drivers. Signs, warnings or signals will not prevent these accidents occurring; the careful, prudent driver will not take such a chance.

In order to reduce the number of street accidents the main thing necessary is education—education that will teach everyone (be he employe, passenger, pedestrian or auto driver) what it is that leads to accidents and how they can be avoided; particularly education of the young child and the school boy and girl regarding the value of life and limb, the wastefulness of unnecessary haste and neglect; education of the men and women by the passing and strict enforcement of reasonable ordinances; and education of the drunken driver and persistent chance-taker by a straight jail sentence.

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Bacteria Extinction

THIS is a problem that confronts all large industries having the health of their employes at heart.

In order to be overcome it is necessary for the industrial plant to employ a bacteriologist and to equip him with all necessary apparatus for the analysis of cutting oils, solutions, industrial gas fumes, air conditions, food, etc.

The picture opposite shows the bacteriological department of the Ford Motor Company and part of the necessary equipment for carrying on the work of the bacteriologist.

Bacteriological Department

THE picture opposite shows electrical welders in the Ford shops equipped with a suction system to remove all dangerous fumes, also small glass guards in front to protect from flying sparks the eyes of operators.

Electrical Welders

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EDITORIAL

GETTING BACK ON THE TRACK

WAR means destruction of life and property and the cessation of productive labor by millions of workers. Its byproduct is social disorganization.

Destruction of life reduces the number of workers. Destruction of property and suspension of manufacturing make food, clothing and shelter inadequate to the demand.

The cure for the resulting condition is more work by the reduced number of workmen, and economy in consumption of staples, until the losses of war are made up.

Social disorganization intervenes at this point and men who left industry for war, men who were paid excessive wages for making munitions of war, men who have been fed on unsound economic doctrines demand, on various grounds, returns for their labor which are not based on the values produced by that labor.

This overpayment reduces the amount of work done, as many of our working classes will not labor beyond the extent necessary to the immediate maintenance of their accustomed scale of living.

Our industrial train is more or less in the ditch and it is taking the combined efforts of all sorts of engineers to get it back on the track.

In this work the Safety Engineer plays an important part. His work is to prevent further reduction in manpower by protecting workmen from accident and disease. His duty is to surround them with working conditions that will increase production and create a morale that will make them *want to do so.*

It is a most important thing—the "desire to produce rather than to destroy." It is largely a mental condition, perhaps a spiritual one. It is recognized by physiologists and might be described by their term anabolism as distinguished from katabolism.

What is needed most by society today is the creation of a world-wide desire to produce—the cultivation of the instinct of the bee or the ant rather than the ruthless destructiveness of wolves.

Industrial morale can accomplish this and safety engineers seem to be the ones by whom a great part of the burden must be borne.

The wastes of war, the needs of peace, the desires of labor, the feeding and clothing and sheltering of the world, the re-establishment of the buying power of the dollar, depend upon more work and less spending and upon securing a unit of product for every unit of pay.

"God bless the man who does the work for which he draws the pay."

Especially, if he boosts for Safety.

THE JITNEY'S BLOODY PATH

THE jitney craze, every phase of it, is opposed to public safety. The jitney is a nuisance—it kills and injures passengers and pedestrians, it is polluted with the germs of epidemics, it is financially irresponsible, it laughs at the laws of liability and compensation.

Members of city councils who vote to turn over the public streets to jitney swarms are unwise and extremely shortsighted.

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In every city council there are cheap politicians, who are willing to use the jitney in order to harass the electric street railway—to surrender their constituents to a pirate that is exacting a toll, increasing daily, of lives, limbs and health.

They pay no heed to the fact that such financial institutions as life insurance companies and savings banks have hundreds of millions of dollars invested in the securities of electric railways, vast funds held for the protection of thrifty people, in their own cities and elsewhere.

"At the present time the credit of the electric railway is non-existent," said Gen. Guy Eastman Tripp at a recent meeting of life insurance presidents.

Every thoughtful mayor and alderman in the land should obtain and read General Tripp's address. In it they will find sound economic arguments for suppressing the jitney in order to conserve great protective investments in which their own people are directly interested.

The local duty to save the lives and the limbs and the health of citizens speaks loudly. The jitney's bloody path is visible in every community.

THE DEGREE OF S. E.

To the Editor of Safety Engineering:

SIR: The October number of SAFETY ENGINEERING has been received and I like, in many respects, the general appearance of the "Safety Engineer's Functional Chart," as published in your magazine, better than the one I issued.

Your explanatory paragraphs explained my position thoroughly. I believe there will be many interesting discussions respecting the safety engineer's functions before anything definite is arrived at. Definiteness will be brought about only by a well selected, competent committee presenting its opinion before just such an organization as the American Society of Safety Engineers.

It is an important matter to decide, one that will require considerable thought and planning before the functions can be finally decided upon. In fact, I do not believe that even the engineering society will be the final judge in the matter. From a theoretical standpoint, a technical school will arrange a curriculum for the course it will require before conferring the degree of S. E.

I feel elated by your opinion that my graphic presentation is the best, up to this time. While the functioning may be otherwise expressed by an engineering society or a technical school, my chart may remain fairly intact in the future. I appreciate your co-operation immensely.

It may interest you to know that we are conducting a school of safety in Cleveland, the sessions of which are attended by about 400 foremen, superintendents and purchasing agents, over which assemblage I have the honor to preside.

THOMAS P. SCULLY.

Cleveland, Ohio.

SAFETY BELTS

To the Editor of Safety Engineering:

SIR: I would like to ask advice on a problem which confronts me and which has caused some thought.

The safety bolts which support safety belts used by our window cleaners are beginning to corrode and the wood of the window frame to which they are attached is not exceptionally strong.

We expect to overcome the corrosion by using bronze lag screws and I also suggested using expansion bolts and securing the screws to the bricks. Upon second thought, however, as it is practically impossible to supervise the installation of these expansion bolts (and as this job must be done carefully), I have decided to ask your assistance.

I would deeply appreciate any suggestion the readers of SAFETY ENGINEERING may give me.

We would be willing to change the type of belt now used and in fact change the entire method in order to obey the slogan "Safety First."

SUBSCRIBER.

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Automatic Shavings Pan Dumper

New Type of Automatic Shavings Pan Dumper

THE Automatic Shavings Pan Dumper, an invention of William L. Taylor of the Willys-Morrow Company's plant in Elmira, N. Y., will appeal to the safety engineer as well as to the efficiency expert, as it will remove a slipping hazard, when installed at the plant, which has been a constant menace.

In crossing the oil separating room, where the steel shavings are separated from the oil, the conveyor system is raised from 2 to 4 feet from the floor. An iron platform, from which the pans have formerly been dumped by hand. runs along the conveyor. This platform becomes very slippery from the oil.

From the efficiency point of view the apparatus will save the labor of 3 to 5 men, and from the point of view of the safety engineer it will eliminate the danger of injury to these men.

The apparatus is entirely automatic. The track in the separating room will have three dumps, and the mechanism is so arranged that the pan, when placed on the conveyor at any point, can be adjusted to empty itself at any one of the three dumps. It is also possible to have the pans alternate, the first dumping at number 1, the second at number 2 and the third at number 3 and so on, or all can be dumped at either of the three points.

The automatic dumper is not limited to this kind of work. It can be adjusted readily to almost any type of gravity conveyor. It can be used to handle any kind of materials.

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Old Records of a National Bank

In one of the upper stories of an old building at 10 Dutch Street, N. Y., badly damaged by fire October 24, the National Bank of Commerce had a storage place for some of its old records. They were kept in bins, wholly unprotected from fire dangers. The picture shows how neatly arranged for ready reference they were after the fire. The moral of the picture, of course, is that records that are worth keeping should be worth protecting in fire resistive cabinets. Probably there are thousands of cases throughout the country where banking and other business concerns are storing old papers in the careless manner of the National Bank of Commerce.

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The Weakness of Unprotected Steel

By V. L. Benedict

Manager, Los Angeles Fire Alarm Company

TO the uninitiated a heavy steel girder supporting floors or roof seems to be immune from damage by fire. A factory manager may see olyn the great strength of the steel, and consequently will consider his plant to be safe from structural collapse.

For many years the National Fire Protection Association has preached the doctrine of covering all structural steel columns and girders with substantial fire resistive material.

The Parker Building fire in New York City showed that protection to the columns of 1 inch terra cotta and 1 inch plaster, with 1¼ inches air space around the column, did not prevent collapse of many columns.

The fallacy of reliance upon unprotected steel is strikingly illustrated by the Pacific Electric Shops fire, September 10, 1919, at Los Angeles. The building destroyed was the warehouse, 200 x 57 feet, 2 story brick. The second story floor was supported by two steel girders on 10 x 10 wooden columns. Each girder consisted of two I beams, 12 inches high, 5 inches wide, ½ inch web, spaced 5½ inches apart, on a 10 x 10 wood column. The fire was under control in 1 hour, and only a few of the 10 x 10 columns were destroyed, the remainder being charred less than ½ inch.

While the roof collapsed, the floor joists mainly are intact, while the steel girders buckled and sagged, still supported by the wooden columns. The second floor was a wood-working shop without any unusually heavy loads.

The remarkable feature of this fire is the expansion of one girder, which, due to destruction of one column, broke apart and did not return to its original position upon cooling.

At the point where it passed through a fire wall into the boiler room, which was not damaged, the girder carried portions of the brick wall along with it to a distance of 5¼ inches. The end of the girder was supported by the exterior wall of the boiler room. The expansion drove out many bricks, which, falling on the sheet iron cover of a tank, convinced the night engineer that the whole building was coming down over his head.

"The remarkable feature of this fire is the expansion of one girder"

The lesson from this fire is that, without destruction of the few columns, wooden girders would be intact except for surface charring, while the unprotected steel could not support the load and sagged in several spans, and evidently would have collapsed if the load had been heavier.

Fire-resistive covering of structural steel makes it immune from any but the most extraordinary exposure to fire for a considerable time. Such exposure is extremely improbable in modern construction with areas subdivided and when practicable equipped with automatic sprinklers.

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Safety News and Comment

Dr. Chaney to Address Engineers

IT is announced by the American Society of Safety Engineers that at its January 16th meeting the society will be honored by the presence of Dr. Lucian W. Chaney of the U. S. Bureau of Labor Statistics, Washington. Dr. Chaney has been described as the "National critic of safety activities" and he has promised to talk on the functions of the safety engineer and just where he fits into the general scheme of things, also on the value of engineering revision in its relation to certain departments of safety work.

Child Labor Day

CHILD LABOR DAY is to be observed throughout the country on Sunday, January 25, in churches; on Monday, the 26th, in schools, and on Saturday, the 24th, in synagogues.

The year 1919 marked the passage of the Federal child labor law which places a 10 per cent tax on the net profits of establishments employing children under 14 years of age in factories, mills, canneries and manufacturing establishments, of children under 16 in mines and quarries, and of children between 14 and 16 for more than 8 hours a day, six days a week, or at night. The great value of the Federal law lies not so much in the number of children it affects, for they are a small proportion of all the children gainfully employed, but in the fact that it makes uniform the laws of the 48 States and sets an example for the States to follow in the industries that are not reached by the Federal law.

Compensation Laws in 1919

THE annual report of the secretary of the Workmen's Compensation Publicity Bureau says that four States, Alabama, Missouri, North Dakota and Tennessee, enacted compensation laws for the first time in 1919. In 29 States and one territory amendments were made to existing laws. Compensation acts are now in force or are about to go into effect in 42 States and three territories. As yet no compensation laws have been enacted in six States: Arkansas, Florida, Georgia, Mississippi, North Carolina and South Carolina.

New England Congress in March

THE First Annual New England Industrial Accident Prevention Congress is to be held at the Hotel Bancroft, Worcester, Mass., on Tuesday, Wednesday and Thursday, March 9, 10 and 11. The Congress is being sponsored by the several local councils in New England, also by the Associated Industries of Massachusetts.

Report on Inflammable Liquids

THE National Fire Protection Association's Committee on Inflammable Liquids has completed an advance report, which may be had by members of the association on request. Any person desiring to know the opinion of fire underwriters on inflammable liquids should communicate with the N. F. P. A.

Committees of the N. F. P. A. that are to meet in New York City during the week of January 18 are the following named: Automatic Sprinklers, Executive, Safety to Life.

Head and Eye Protection

UPON invitation extended by the Bureau of Standards, Department of Commerce, the American Society of Safety Engineers, and other bodies, have co-operated in the preparation of a tentative draft of a National Code for Head and Eye Protection.

The preliminary conferences on ways, means, etc., brought about the appointment of the following committee of the

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American Society of Safety Engineers for the purpose of co-operating with the Federal Bureau of Standards and the American Society of Mechanical Engineers in the formulation of a National Industrial Safety Code on Head and Eye Protection: G. E. Sanford, supervising engineer, all plants of General Electric Company in United States, chairman; Gordon L. Berry, field secretary, National Committee for the Prevention of Blindness; George M. Douglas, safety engineer, American Smelting & Refining Co.; George T. Fonda, safety engineer, Bethlehem Steel Company; T. P. Bradshaw, Roselle, N. J., formerly with American Museum of Safety.

Railway Fire Prevention

THE annual meeting of the Railway Fire Prevention Association was held in Chicago at the Hotel La Salle on November 18, 19 and 20. In order not to conflict with the National Railroad Accident Prevention Drive scheduled by the United States Railroad Administration for the latter half of October, the annual meeting of the association was postponed to the dates named.

Labor and Industry in Pennsylvania

THE Department of Labor and Industry of Pennsylvania has begun the issuing of a bulletin for the information, mainly, of the members of the department. The department's Museum of Safety Appliances is now an established fact and is temporarily located in the basement of the Keystone Building, Harrisburg.

Codes under consideration by the department relate to textiles, head and eye protection, sanitation for industries and protection of employes in the laquering industry.

Merry Holidays in Reading

AN exceptionally attractive holiday gift to employes has been announced in Reading, Pa., by T. A. Willson & Co., Inc., manufacturers of goggles, where every employe is to be presented with the "rest of the week off" after Wednesday, December 24, including Christmas, on full pay. Not only will the Willson factory workers receive full pay for the big "rest-up," but the bonus system will continue just as though the factory were in continuous operation. This unusual holiday announcement was all the more in the nature of a delightful surprise because the factory is running on full time to meet the extra heavy demands for its product.

Teacher Ruined The Record

IT has been an old saying on the part of preachers and teachers: "Do as I say and not as I do" and practice has been only supplementary to precept. All of this is more or less amusingly illustrated by an item in the Minneapolis *Journal* telling of a teacher who had just finished lecturing her class on the dos and don'ts of No Accident Week. Then she opened the geography class. A map of Europe was needed for the lesson. She attempted to pull it down from its clumsy wooden case. The last pull brought the case and all down on the teacher's head. She saw a few stars and fell to the floor. The children gathered around her in dismay, but with no word of sympathy. Then one small boy decided it was time to speak, and he said: "Now she's gone and ruined our record for No Accident Week."

Avoid Accidents, Save Lives

DURING the 19 months the United States was in the war, 56,000 American soldiers were killed in Europe. During the same 19 months, the Pacific Gas & Electric Company notes, 226,000 men, women and children were accidently killed in the United States.

These figures have been quoted before, but deductions from them continue to be in order. Thus the Gas & Electric Company's direct talk to its employes will not be disputed by any person interested in the safety movement:

"Resolve to keep yourself and your fellow workmen forever out of accidents. Remember that an accident avoided may be a life saved."

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Inspections for Matches in Factories

THE Pennsylvania Department of Labor and Industry has adopted a rule regarding the use of matches in certain industries:

No employe shall have in his possession at any time in any room or other portion of a building where ether is manufactured or otherwise handled, any match or other flame producing device, unless he is authorized in writing by the superintendent to do so, in which case approved safety matches only may be used.

A search for matches shall be made by some authorized person at least twice a week, at irregular intervals. The finding of a match or other flame producing device on the person of any employe not authorized to have matches in his possession shall be cause for instant dismissal, and the fact shall be reported to the Commissioner of Labor and Industry.

Fire Drills at Home

E. R. TOWNSEND, western fire protection engineer, practices what he preaches, and has a regular fire drill in his home in Edgewater, Ill. Whenever he gives the alarm the Townsend youngster runs directly to his father, his mother goes to the telephone to turn in the alarm, and the maid starts for the fire alarm box. As soon as the child is in a place of safety and the alarm turned in, each has his precise duties as regards the chemical fire extinguisher, the pail of sand and the ladder, which are the home fire-fighting devices.

Some Unusual Accidents

THE Travelers Insurance Company has compiled an interesting record of accidents showing that "truth is stranger than fiction":

An aeronaut was killed in Wyoming by colliding with a mountain in a snowstorm.

The explosion of a can of frozen tomatoes, placed in the oven of a stove, wrecked the stove and pieces of furniture.

A farmer, prying open an ice-bound barn door, lifted the door from its hinges, which fell upon him, killing him almost instantly.

A passenger, alighting from a street car, stepped into an open sewer-manhole; he was carried away by a torrent of water in the sewer and was never seen again.

The force exerted by a bursting tube in a water-tube boiler threw a man into a pile of soft coal; a piece of coal, forced into his mouth, was convulsively swallowed, causing a severe abdominal injury.

A workman, repairing a fire escape on a building, sawed off a steel post on which he was standing and was killed by the resulting fall.

A man who had just had installed a glass eye was dining in a restaurant when the eye exploded, rendering him unconscious and causing a waitress to become hysterical.

A trolley pole on a street car struck the branches of a tree, causing the trolley rope to swing suddenly; a coil of the rope passed around the neck of the driver of a passing truck, dragging him along the street before the car could be stopped.

A bumble bee, flying into the face of a young woman driving an automobile, frightened her so that she ran into a kettle of hot tar that was being used to repair the road; the tar was thrown over two workmen, burning them severely.

Workmen had taken hold of the pole of a wagon for the purpose of cramping the front wheels, when a frightened cow ran against the pole, which swung violently, striking and killing one of the men.

A man was driving a mule through a narrow passage-way between buildings; as he passed under a rapidly revolving shaft that transmitted power from one building to the other, he swung a long-lashed whip that was fastened to his wrist by a leather thong; the lash, wrapping around the shaft, whirled the man, whose head struck the wagon, killing him instantly.

A corpulent man, who had dined pleasantly, breathed deeply and satisfactorily, causing one of his waistcoat buttons to snap; the broken part flew across the table and cut his companion on the eyelid.

Carefulness Is Personal Capital

THE average packing house laborer earns more than $100 per month, equivalent to 6 per cent interest on $20,000 or 4 per cent interest on $30,000. The Cudahy Packing Company calls the attention of its employes to the fact that freedom from personal injury is real capital for every workman:

"Why take a chance of personal injury through carelessness? 'Safety First' is your protection on your investment—it is the insurance on your business or employment. Being careless is like investing your money in a 'wild-cat' oil stock. Your interest will cease.

"If you would take care of a $20,000 investment, then use judgment and practice 'Safety First.'"

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(*Continued from page 262*)
and the public generally as to exactly the scope of work in safety and of the type of men who do it and who have become generally known as safety engineers.

To attempt to define with exactness the work of these men in view of their very extended duties at present would require the presupposition of such a variety of postulates as to almost preclude the creation of an exact definition or term. What I shall endeavor to do, therefore, is not to set down a limiting definition within the close confines of which such an engineer would be expected to operate, but to indicate the logical development that has been made and the segregation of tasks that must be carried out in view of present conditions and what the past has revealed as the limitations of the reasonable scope of the activities of the safety engineer and in some measure to show its relation to all of the fundamental fields of engineering.

The safety movement started without any background of experience whatever. It was virtually a new idea in our industrial life to designate to one person the problem of protecting from harm and accident the persons of employes in a plant. In a few widely separated cases, farseeing employers had unconsciously developed a safety sense in connection with much of their other work. They were those rare employers of farseeing and deep thinking and analytical natures that had detected the weaknesses evidenced by unnecessary death and injury to their men. Their efforts were present as a controlling feature of their business plans, but its actual identity as a movement peculiarly directed toward safety was lost through its connection with the multiplicity of other departments and individuals. It was a scattered effort whose concrete results were lost through diffusion and through the many activities this effort touched. When attention was definitely focused upon the fact that lives were needlessly lost, living men obliged to carry dismemberments, functional impairments and disease through the remainder of their lives as a result of the failure of employers to provide safe and healthful working conditions, the thought of careful men was fixed upon the need for providing against such loss.

The analysis of such accident records as were available at the time appalled them; the loss in money scared them. Action was bound to and did result from these analyses. It became evident in the industrial life of the country through the appointment of safety men, a safety movement in the governmental life of the nation through the creation of industrial commissions and boards and of laws compelling workmen's compensation to be carried by employers.

FIRST STEPS IN SAFETY WORK

The first and most natural step was to guard machines and equipment that presented instances of exposed hazards so obvious as to cause the wonder, when attention was directed to them, that they had not previously been guarded. This development went on with some rapidity and little or no uniformity and with no previous guides that the men doing the work could follow. In view of the work accomplished today much of the earlier work was extremely crude. After a time, however, it was found that for some reason or other the accident frequency and severity rates remained practically constant and in some cases began to increase. It was then discovered that education and instruction must be applied to those men not familiar with safe processes and methods as well as to inculcate in all persons a sense of a need to give more attention by themselves to their own safety. This was a candid recognition that guards as such could not entirely eliminate all accidents, but that a skill in safety must be developed to supplement the skill in the manipulation of material used in processes.

Following this educational effort a still further reduction in accident frequency was observed and it continued for a time until a second standstill in the accident reduction rate became evident. Further study revealed the fact that it was necessary to devote considerable attention to those conditions and circumstances that affected the health of

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employes. Suitable sanitary conveniences and bathing facilities were provided. Ventilation was so improved that dusts and fumes were taken away from work places so that workmen were not exposed to them. Adequate light of a proper amount and intensity was provided so that it reached the work without flicker or glare. Rest periods, lunch rooms, recreation places and other things of this sort were developed to make the working period less severe and to provide that complete change and rest, even if for only short periods, that makes the human machine work more efficiently and with less harm to itself.

After this work had been in progress for a time there came another temporary halt in the frequency of accidents. Men then began to turn themselves more to a study of the fundamental conditions under which men work. The layout of plants, the design and equipment of structures, the handling of materials, and even the conduct of the manufacturing processes themselves, whether they involved materials that were generally harmless in themselves or presented specific hazards, began to receive their thought. Immediately a further reduction was observed.

The movement for safety has now reached a point, however, where there seems little left to do more than to apply some one of these four well known methods of accident reduction to a particular situation in a given plant where statistics or conditions reveal such work to be necessary. There has been, and probably will be for some time, a difference of opinion as to which one of these four means of accident prevention and reduction should receive the most attention: safeguarding machinery, educating workmen in safe practices, attention to the health and welfare of employes or revision of the engineering practice and methods. Various concerns and companies have available statistics to prove their contentions in one way or another, although value cannot always be placed on these, particularly because of the fact that only recently has the method of recording accidents given a reasonably accurate determination of the exact weight that must be placed upon the conditions they reveal and the point at which effort must be directed to bring about a further reduction.

It is not strange, when one has considered these facts, to realize that an employer is faced with the problem of deciding whether his safety man should be a skilful mechanic, a teacher, a physician or an engineer, nor is it unreasonable to think that his decision will be governed more or less by what the statistics he has available covering his plant may reveal or what his own personal prejudices and desires may cause him to believe necessary.

If, for example, a man is conducting a business in which a large number of heavy and complex machines are handling dangerous chemicals and materials creating much dust in a factory where the number of employes is relatively small, he would probably believe his work could be done best by a good mechanic, who was familiar with the processes, and the employment of a part-time doctor. On the other hand, a man employing a large number of men and women at light work, in a plant where food is prepared, might feel that he would be served sufficiently by a man that was familiar with and enjoyed welfare work rather than by a man who was a good mechanic. A third man manufacturing automobiles and employing men operating machines in numbers and using material in great variety in a more or less complex arrangement, and supplied with power plants and distributing systems requiring expert supervision, would feel that he needed a real engineer.

Considering, then, the wide variations of conditions in these three ordinary cases, and recognizing them as only a few of the infinite variety in our complex industrial life, how is one to measure a man who must perform some one of the branches of safety work to a very considerable extent and the others to a lesser extent, to determine whether the services of a technically trained engineer or of a broadly trained man possessed of inherent managerial qualities

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can best do the work? To what extent then shall one consider the entire safety movement as coming under the broad head of engineering rather than under employment supervision, industrial service and relations? How can one definitely place safety work in the engineering groups and avoid a discussion of almost endless extent?

To do this it is necessary to consider the matter from a slightly different angle and I must be permitted a digression that may seem, at this point, quite irrelevant to the general subject, but which has nevertheless a direct and very important bearing in determining the type of man that should be connected with safety work and particularly with its engineering problems.

One of the best definitions of "education" that has ever come to my notice is the one given by Mr. Whitney, of the Workmen's Compensation Rating Bureau, in a paper read before the American Teachers' Association at their annual meeting in Atlantic City on July 4, 1919. Mr. Whitney says that "an education is the building up in the individual of a means for comprehending the world." By the world he means that portion of the world's activities in general that is bound to come within the scope and experience of the particular individual. With this simple and fundamental definition as a guide, is it not possible to attempt to define somewhat the scope of effort of an engineer, regardless of the particular branch with which he may be connected? Might not one paraphrase Mr. Whitney's definition of education to say that "the education of an engineer is the building up within that individual of a means for comprehending Nature's forces and the laws that govern them in order than he may devote this knowledge to a particular use in some field or branch that draws his interest." I would not for a moment convey the idea that an engineer's whole time is, or should ever be, devoted to the technical side of his training, but that he, like all educated men, should be concerned with a full comprehension of the world in which he moves.

EDUCATION BY STUDY OR EXPERIENCE

Knowledge is gained in two ways: By direct contact with the conditions under which we live—the method commonly known as experience—and by guided thought such as is to be secured in well regulated school curricula. The foundation of education, whether in engineering or in any other field that is to be gained by means of study in school, is usually governed by matters of economy. By means of study a man can obtain in a few years the fundamentals of his future work that might take him a life time to gather elsewhere and so enable him to start his active work in practical life, which is really the beginning, at a much earlier date than he otherwise could. Many of the foremost men in this country have never been within the walls of an institution of learning, yet, on the other hand, some of the foremost men have spent many years within such an institution. Careful analysis, however, shows that the larger number of well-known and truly successful individuals are men who have developed broad-minded and rich characters as a result of the years of study and effort they gave to guided thought in schools and universities. Such men are found in every walk of life—in engineering work, as well as in others.

Engineering as a profession has recently begun to be measured in its true importance. The first men to whom the Government turned when our entry into the World War forced vast problems of science and production upon it, as well as the men who were first in the fighting area and who brought the first tangible results both here and abroad, were men who were trained primarily as engineers. They were able to comprehend the situation and to do its work quickly and well because of their familiarity with the laws which governed the conditions with which they were confronted and because of their inherent ability to think, plan and execute in an ordered and logical fashion. It is interesting to note, also, that many men in other than strictly engineering lines performed remarkable feats in this essentially technical field, not because of

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their technical training, but because they were fundamentally engineers at heart and possessed of that natural sense and ingenuity in engineering matters that is born in some men, and which, even though it may be diverted by totally different interests, cannot be gainsaid in its ultimate appearance when stirred to action. It was the men not technically trained who did the "fuddling" in the war work.

While the results of engineering knowledge are made evident in concrete form by the work of men who are trained as engineers, the tools with which they work and the laws of Nature that they follow have been studied and their possibilities have been revealed through the work of students and professors within the walls of schools, laboratories and research departments. The development of the welfare of this country, or of any other, as a result of engineering and scientific work is dependent upon the researches of these investigators and explorers into the secrets of Nature. As early as the nineteenth century, Tredgold, who was one of the first civil engineers and built many of the canals in this country and England, made this significant statement: "The real extent to which it (engineering) may be applied is limited only by the progress of science. Its scope will be increased by every discovery in philosophy and with every invention in the chemical and mechanical arts."

Engineering is both theoretical and practical. One group is concerned with a study of real problems still unsolved and the other with the application of the facts that have been revealed by such study to the conditions they can correct. Frequently in such men as Thomas A. Edison or George Westinghouse, both the theoretical and practical man are combined in one individual. Modern life has grown to be very complex and when one considers the multiplicity of things that now minister to our daily comfort, and that are even considered as absolute necessities to our existence in the larger centers of population, one is appalled at the amount of work that is performed under the guidance of technically trained people.

The average person usually associates with the term "engineer" a man of rather limited experience in the general humanities of life but filled brimming full of knowledge concerning his particular line of work. Some technical specialists, unfortunately, are such men, but the larger, broader-gauged engineering men are not of this sort, nor do they believe in such restricted mental development.

SIX PRINCIPAL QUALIFICATIONS

The Carnegie Institution recently made an investigation of methods of engineering education followed in various schools in this country and in the practicing profession to determine something of its scope and value as a vital part of our national life. One of their questionnaires sought to find out the six principal qualifications that were considered essential in a well equipped engineer, regardless of the particular branch in which he was interested. As a result of this investigation the almost universal opinion regarding the qualities of such a man and their relative importance were as follows: Character, judgment, efficiency, understanding, knowledge and technique. I might say that this was the expression, not of professors who had never been in business, nor of the untrained minds of young students, but was the mature, careful thought of business and professional men who had been a life time in the work.

If, then, engineering work in general requires such broad, fundamental training, how much more then should a man who deals not only with concrete, lifeless materials that can be made to follow natural laws, but with human beings who are subject to such divergent impulses and instincts, be equipped with the greatest amount of information and experience in order that he shall be enabled to appreciate the mental attitudes and peculiarities not of one or a group but of many people. How important this attitude and training is may best be illustrated by a consideration of China, a country whose history antedates the Christian era, and which

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possesses some of the oldest engineering works of which we know. China lacks a conception of her possibilities capable of development, China has been founded and grown upon experience only. The imagination that is broadened and trained by a conception, not of immediate problems, but of others apparently unrelated and immaterial, has resulted in our country developing a transportation system and a means of communication that have made available raw material that at times seemed inaccessible, and has directed its use in such a manner that our growth in less than four hundred years has been infinitely superior to that of China in a period of 4,000 years.

And where, at last, I hear you ask, do these various conceptions lead? May I venture the thought that engineering is not necessarily a matter of using theory alone to a solution. To study to do such work, not only with the idea of immediate gain for himself but with the thought that, as a result of his effort, the lives of many men shall be made better, is the broader conception of the true engineer.

One other consideration I must bring to your attention at this time, because it may have escaped your notice, and that is the fact that the pouring out of apparently almost unlimited natural resources during the last few years has indicated in a practical way the safe high water mark for such procedure in this country. It is no longer possible to waste raw materials through improper methods or labor, through the same reckless disregard of fundamental hygienic laws that has been going on during the last three centuries of our formative growth. It has become evident to thoughtful persons that we must now begin to do what European countries have been forced to do for several generations—secure from every bit of raw material the last ounce of useful production and from labor only real results from actual effort put forth.

Those concerns, therefore, which have recognized these fundamental truths and necessities and have set out to secure men capable of working on such principles, are the ones which will outstrip their competitors and be successful. Such efforts apply not only to the use of raw material but also to the wise application of human labor to work. The destruction that raged during the great war destroyed a large proportion of the productive manhood of the world, and, though our direct loss in this respect has been small, yet we of necessity must feel the effects of these losses in other countries. The effects will appear first in the reduction of the amount of common labor available for work here. To make good this loss the higher efficiency of the men employed in this country must, of necessity, be provided with a means so that they may work more and more with machinery and so obviate the unnecessary toil that can be thus eliminated. Directly, and in proportion as this is done, there will be a variation in exposure to machinery hazards and occupational diseases.

In this general re-co-ordination movement that trends so largely into the realm of engineering, the men who are concerned with making safe and healthy the conditions under which men toil, or under which they live and have their being, must be primarily trained as engineers. Into his hands more and more will be placed problems that require experience, far-sighted judgment and balanced sympathies. He will be enabled to bring to bear upon their solution many ideas and thoughts that he has gathered in other fields, and to use a broad sympathy and understanding of the laws of Nature that should function in his mind almost as unconsciously as his breathing does in his natural existence. He will lose no opportunity that will fit him in these directions.. It is men who work with this larger understanding in mind and who have studied for, or acquired through experience, the necessary training and personal background who are really engineers. If that work is directed toward the preservation of human life they may be correctly, even though broadly, termed Safety Engineers.

"SAFETY ENGINEER" DEFINED

Perhaps I may have unconsciously arrived, through several steps, at the

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summation of the qualities of a safety engineer, and have given, even if loosely, a definition of such a person. If I were to put a definition of "safety engineer" into a few words that would enable an employer, or any other intelligent person, to appreciate the qualifications of such a man from the standpoint of actual technical training, and, at the same time enable him to appreciate the scope of vision, experience and ideals that ought to supplement the technical training it might be perhaps in this wise: "Any person who, through adequate training and appropriate experience, understands and can interpret the laws that control the materials and forces of Nature and their effect upon the human body, and is capable of controlling or using these forces in a manner that prevents their harmful effect upon human life, may be said to be a safety engineer." This definition covers that man who specializes in the engineering side of safety.

Only as far as a consideration of these facts is forced upon employers, brought to the attention of the public and followed consistently in their work by capable safety engineers themselves, can their work ever come to be considered as true engineering effort and their accomplishments rated on a basis equivalent to other engineering efforts.

To attempt to limit the activities of an engineer so that he must deal wholly with concrete laws, materials and conditions as separate and apart from the motions, the psychology, the desires and habits of human beings, is to force the present conceptions of the safety engineer's work, now generally prevalent, against their natural impulses and into channels to which they are not yet accustomed. The proportion of engineering, of education, of welfare work and of medical work with which any single safety man must be concerned is dependent upon the particular conditions which he faces in his particular job. In any plant of consequence circumstances are bound to be presented where the protection of human life from injury and disease is involved to a degree sufficient to require the most thorough engineering experience more frequently than will be the broad sympathy, the kindly attitude, the effort to impart knowledge and the appreciation of the workings of the human mind and body. In view of what has been revealed by statistics, by the trend of our National development and by the circumstances with which we are faced in the increasing substitution of mechanical operations for those of manual labor, the safety man must more and more devote his time to the study of conditions from a purely engineering basis, and more and more lend his experience and sympathy to those other men who devote their time to the welfare, to the physical condition and repair of the body and to the enlargement of the mind, which is their particular concern. Only in so far as he does this is he free to develop, unhampered, the broad, constructive policies concerning the safety movement and bring the best results in his plant and return to his employer that measure of devotion and service which meets with substantial reward.

American Society of Safety Engineers

THE regular monthly meeting on November 21 was called to order by President Mowery, and after the reading and approval of the minutes of the previous meeting, the president stated that plans were progressing which would insure a close co-operation between the society and the National Safety Council.

The president announced the names of the members of the various standing committees and the secretary read the names of several men who desired to become members of the society.

Chester C. Rausch, Technical Director of the Safety Institute of America, presented a most excellent paper entitled "The Safety Engineer—His Qualifications and Duties." This paper, published in full in this number of "SAFETY ENGINEERING," our official medium, brought forth a very interesting discussion. One of the important points brought out was in regard to the establishing of safety courses in colleges and universities. Mr. Rausch stated that, in his opinion, such courses should be based, first, upon a good general education of three or four years followed by two or three

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years on some special branch of engineering with particular reference to the development of the safety viewpoint. He said that safe practices should be emphasized, in connection with specific applications, from time to time during such courses, arguing that the consideration of safety in design should become as much a matter of habit as the consideration of strength or other characteristics of a structure. He pointed out that when designing for protection against corrosion it was obvious that the smallest surface was the best; he called attention to the fact that the center of gravity must be taken into account and structures designed, with that in view, in order to give the greatest safety in service.

Mr. Alexander referred to the co-operation established between the Cincinnati University and the various industrial concerns in Cincinnati in training men, not only in technical lines, but also along the lines of industrial betterment in general.

Mr. Berry referred to the value of an education along safety lines and inquired if the Safety Institute could help in that course. Mr. Rausch replied that the Safety Institute was trying to help in education along the lines of safety with special reference to the practices now in vogue, and said that the technical courses in colleges could be used to educate the student in safety matters. Mr. Rausch also stated that the Educational Committee of the National Safety Council was working along this line and that the schools really wanted information for use in their work. He emphasized the fact that the fundamentals of safety could and should be effected in connection with machine designing, that if the designer were properly trained he would consider safety instinctively in designing new equipment.

Mr. Smith asked Mr. Rausch if he thought that the indirect method of education was better than the direct method, and Mr. Rausch replied that he could only give his personal view of the subject. He stated that the basic idea of safety was not easily grasped by some men, that they need help, while others have the idea naturally. He thought that a separate course in safety would not be as good as to inculcate the fundamental ideas of safety into all engineering courses. By this means the habit of thinking "Safety First" would become strengthened—the emphasis of certain points would be much better for most men than a special course in safety engineering.

Mr. Smith described the training of men by Henry L. Dougherty & Co., for executive positions as illustrating one of the ways safety engineering could be developed by large corporations. He suggested that a two years' course along technical lines with particular reference to safety matters would be a good thing.

Mr. Berry thought that a general technical training would not always be complete enough along safety lines, although a safety engineering course would develop men much better.

Mr. Rausch replied that some schools would undoubtedly offer special courses in safety engineering, but all technical schools would develop the "safety sense" in their courses. If a man desired to specialize in safety engineering he could take a post-graduate course in that subject.

Professor Bliss, of the New York University, expressed great interest in the general question of safety engineering. He stated that most college courses are becoming too specialized, and that it was very hard for the average boy or young man to determine what he really should take. He said that fundamental courses were the most important and that specialization could follow. He thought that now is a good time to push the question of safety education, and referred to the fact that many schools have changed their courses since the war in order to conform more closely to modern requirements. He outlined conditions at the New York University and stated that co-operative courses could be developed to a higher degree. He suggested that the Degree of Safety Engineer might be given as the result of post-graduate work by men who had graduated in some other branch of engineering.

President Mowery called upon Mr. Sanford, chairman of the Committee on Head and Eye Protection, to say a few words in regard to the work of his committee. Mr. Sanford had samples of eye glasses of various kinds and gave some details of the proposed National Code on Head and Eye Protection which is now in process of formulation. This code will be similar to the one prepared by the United States Bureau of Standards and the belief is that the code will be very valuable when finally worked out.

The meeting adjourned.

International Pipe Threads Standard

THE American Society of Mechanical Engineers' Committee on International Standard for Pipe Threads held a public hearing, Thursday, October 2, in the Engineering Societies' Building, New York.

The committee prepared resolutions to be presented at the next meeting of the Commission for an International Standard Pipe Thread, in Paris, November 7. The resolutions express the opinions and best judgment of American pipe industries, associations of engineers and others interested in the development of an international standard of thread for pipe fittings.

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"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 410 ALL INDUSTRIES.—THE FIRST AID MAN.—Four years ago, when the "Safety First" idea was young, in this section of the country at least, the writer accepted a position as First Aid with a large refining company he is still with. His duties were explained, and it seemed that all he had to do was to bind up cuts, attend to other minor injuries, and send the more serious to the company's physician in the city.

Having been a druggist for over 25 years, the work was right in line with what I had done nearly all my life. For months I attended faithfully to injuries of all kinds, but the work palled on me, taking only a small portion of my time. I began to receive pamphlets and literature on "Safety First" and to think about "Safety First"—and to talk "Safety First." I began urging the men who came to me for treatment to be more careful; to be especially careful to see that all injuries, no matter how slight, were reported to me at once. I told them something about infection and its danger, and tried in every way to scare into them the idea of "Safety First" along these lines.

Gradually I became more and more enthusiastic myself and I preached "Safety First" to all who would listen. not neglecting the officials of the company, whom I gradually interested to the extent that a bigger, more convenient and better appointed office was given me. I had my "operating room" painted pure white and had linoleum placed on the floor and requisitioned medical supplies and a small surgical kit—pulmotor and such other things that experience had shown me were needed, and needed in a hurry quite frequently.

As time passed I found that the employes began coming in for treatment for the most insignificant of injuries, and to these men I tried to explain most carefully the reason for having to report such trivial wounds, for I might as well say here that I had gotten the company to issue letters to the foremen making it obligatory for the men to report each and every injury, no matter how trivial.

My records began to show a reduction of preventable accidents in comparison to the number of men employed, and also showed a pleasing reduction in the number of days lost through disability due to injuries. In fact, while the first year showed that the employes had lost over 12 years' time through disability directly resulting from injuries, the second year showed only 9 years and a few months' lost time, which is a greater saving of time than appears in the figures, for the reason that there were several hundred more men working the second year than during the first.

To the education of the men along "Safety First" lines do I attribute this great decrease in loss of time due to injuries and to the reduction in number of accidents. On education of the workman must depend very largely the success of "Safety First," and to the First Aid Man must naturally fall the responsibility of driving home the idea that the indi-

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vidual man is largely responsible for loss of time and the suffering that the workingman suffers. Let the First Aid Man question him as to how the accident occurred; let him tell the workman how it might have been prevented, and let him by all means impress upon him the dangers of letting the injury go unattended. Make the big, husky workman understand that it is not childish or womanish to come running to the First Aid office but a simple matter of protecting himself from the danger of infection, the consequent loss of time and the danger of a possible loss of a limb and lowered earning capacity.

Let the First Aid Man not cease to be a first aid man, but let him become in addition an apostle of safety whose voice shall cry out in the wilderness of ignorance, "Make the paths safe by being less careless while at work, your life longer and more useful by having your injuries attended to," and keep on preaching "Safety First" until the men who come in contact with him learn to think and live safety until it becomes a habit and until that habit becomes a second nature that will guide the man to an unmaimed old age.

The writer has charge of seven bulletin boards on which he places the bulletins of the National Safety Council, renewing them twice a week, but it is his idea that more good can be done by eternally lecturing the men and in educating them along "Safety First" lines, that the most good can be accomplished in the least amount of time.

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No. 411

THE FUTURE.—A great deal is being accomplished in promoting "Safety First" wherever danger lurks. The gospel of being careful at all times is becoming universal. Every walk of life—at home, at places of amusement, in fact, everywhere—seems to be awakening to the need and teachings of exercising care.

It behooves all of us to lend a hand and further one of the most worthy causes in the history of time. There are many fertile fields where the seeds must be planted. Like the cultivation of wheat before milling it into flour, the first consideration is to reach the source where the fundamental work must be carried on.

Heretofore, we have learned that, by constructing guards for all kinds of hazards relating to machinery, accidents have been considerably reduced. Now, the point is to start at the building of machinery, calling on the various manufacturers to standardize; to install sufficient and substantial guards at all hazardous functioning parts; to cover gears, belts and pulleys, points of operation, and all other parts, too numerous to mention, wherever the safety of an employe is involved. In the designing of machinery, engineers and draughtsmen can very easily make provision for safeguarding the exposed conditions. By doing that, we are taking the first practical, forward step, not to eliminate accidents, but to materially minimize the probability of accidents. It is indeed a serious mistake to wait until the machine has been delivered to the consumer before rectifying these hazards. The evil is so soundly rooted that the workers of both sexes have felt indisposed to co-operate by keeping home-made guards in place.

From experience, working in different plants, the writer has considered it an injustice to put even a fraction of blame on the factory worker. There is no question that, if started right, the spirit of safety is carried out and generally accepted by the worker.

Another point worth considering is this: How many people know how to use their eyes and heads? I may be mistaken, but I venture to say that most accidents happen through the lack of observation. Children entering school should be taught to look to the right and then to the left, standing rigid as the instructions are given. When they reach womanhood or manhood the practice will never be forgotten, and it is one of the most valuable assets of human nature.

Announcement of the prizes for October articles will be made in a later number.

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Literature of Safety

Accident Prevention, Fire Prevention, Hygiene, Sanitation, Miscellaneous

THE PHYSIOLOGY OF INDUSTRIAL ORGANIZATION AND RE-EMPLOYMENT OF THE DISABLED. By Jules Amar. Translated by Bernard Miall, edited with notes and introduction by Prof. A. F. Stanley Kent. New York, The Macmillan Company. 1919.

This is a scientific and technical book on the re-education of the war cripple based upon the author's experiences as director of the Laboratory of Physiological Research in the Conservatoire des Arts and Metiers at Paris. It is scientific in its treatment by virtue of the fact that permanent disabilities are studied from the functional, medical and industrial standpoint. The cripple's strength and endurance are tested, his re-education scientifically conducted and a special study made of each individual case. The book also treats very fully of the Taylor system and the future of scientific efficiency in which the author places great confidence as one of the means of adjusting industrial problems. A very thorough study has been made of fatigue, physiology of movement and the re-education of cripples. The author deplores the sentimentality of some of the work done for war cripples and warns against anything not strictly economic.

MODERN MANUFACTURING. A Partnership of Idealism and Common Sense. Annals of the American Academy of Political and Social Science. Vol. LXXXV, No. 174. September, 1919.

This volume is a compilation of addresses and papers by various people who have either had practical experience in manufacturing or have been in some close connection with it. Some of the most interesting articles are: "Some Twentieth Century Problems," by Wm. B. Dickson; "The Community Relationship of an Industrial Plant," by J. C. Heckman; "Some Considerations Affecting the Size of a Plant," A Symposium; "Articles on the Personnel," by James M. Boyle; Dr. N. I. Stone, Dr. Hollis Godfrey and D. M. Bates; "The Background of Industrial Democracy," by John Leitch; "Statistical Control Including Costs as a Factor in Production," by Harlow S. Person; "On the Technique of Manufacturing," by H. K. Hathaway; "The Influence of Executives," by Henry L. Gantt; "Research," by A. A. Hamerschlag.

INDUSTRIAL NURSING. By Florence Swift Wright. New York, Macmillan Company, 179p.

The author, a member of the Bureau of Child Hygiene of the New Jersey Department of Health, and formerly an industrial nurse and secretary of an employe's mutual benefit association, writes largely from her own experience and that of others. The book describes the vocational and social side of the work, is not technical in language, neither is it a text book. On the contrary, it is most readable. It covers very fully the different kinds of industrial nursing and discusses the relationship of the nurse to the industrial physician, the employes and the community in general. It points out the various activities which the nurse can undertake as well as those she must avoid. The book covers a broad field, is carefully and interestingly written and contains a great deal of information for employment managers and safety engineers as well as for social workers and nurses.

UNITED STATES TRAINING SERVICE OF THE DEPARTMENT OF LABOR. Training Bulletins.

These bulletins, now 25 in number, were issued for the Training and Dilution Service during the war. They will be found useful to many besides the teachers in industrial schools and workshops for which they are intended. It is difficult to find a concise description of every step in an industry, and these bulletins answer, to a certain extent, this

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inquiry. They give the process of a specific industry step by step and the work of every individual. In some, notably the one on the cotton industry, a list of the different subjects on which the learner should be taught is as follows:

1. Purpose of the machine.
2. Starting and stopping.
3. Safety.
4. Operations by best methods.
5. Difficulties—bad work and its causes.
6. Cleaning and oiling.
7. General care of the machine.
8. Factory rules, regulations, policies, etc.

Bibliographies are appended to nearly every volume. Several numbers are devoted to the garment industry. The best ones are those on the rubber industry (No. 20), cotton mills (No. 25) and the shoe industry (No. 21).

ONE THOUSAND TECHNICAL BOOKS A Selected List with Annotations Emphasizing Especially Elementary Practical Books. Compiled by Herbert L. Cowing. Washington, American Library Association War Service, June, 1919. 123p.

This is a useful list covering general engineering, civil, mechanical and electrical engineering, building, mining and metallurgy, chemical technology and miscellaneous industries. It has been carefully worked out and annotated. It was issued for use in the camp libraries of the army during the war. It does not pay much attention to specific safety books or pamphlets except in rare instances. In the Mining Section many publications of the Bureau of Mines are listed.

REPORT OF MINING OPERATIONS IN THE PROVINCE OF QUEBEC DURING THE YEAR 1918. Department of Colonization, Mines and Fisheries, Province of Quebec.

This report includes metal mines and quarries, there being no coal mines in Quebec. The greatest number of men employed were in the asbestos quarries. The greatest amount of production came from the mica mines, Canada being second in the order of the world's supply, India only outranking her, and the United States following her as third. Out of a total of 7,791 workers, there were 29 fatal accidents. Canada suffered tremendously through the war, and had to take whatever men she could get to work her mines. Likewise, regulations were relaxed and much unskilled labor used. A table of ages of the injured shows a preponderance of accidents among men between 15 and 20. The non-fatal accidents totaled 195. There was one catastrophe at the Eustis Copper Mine, on February 20, when a fall of rock killed 5 men.

THE VITIATION OF GARAGE AIR BY AUTOMOBILE EXHAUST GASES. G. A. Burrell and A. W. Gauger. United States Bureau of Mines. Technical Paper 216. April, 1919.

An experiment to prove the limits of safety in air conditions by the expulsion of waste gases from an automobile exhaust, and the amount of carbon monoxide that can be inhaled without fatal results is described here. The tests show that different people are affected differently, and that a man at work will be overcome much more rapidly than a man at rest. Exposure to an atmosphere containing only 0.20 per cent of the gas will cause a man at rest to collapse within an hour, and exposure to as little as 0.05 per cent will cause headache in several hours' time. When gasoline is burned in the presence of enough air, the carbon is almost entirely converted into carbon dioxide and the hydrogen into water. If, however, there is not enough air, besides carbon dioxide and water, carbon-monoxide, hydrogen and methane are formed.

MISCELLANEOUS

The Underwriters' Grain Association of Chicago has issued two pamphlets describing the Port Colborne elevator explosion and the Murray Elevator explosion at Kansas City.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy losss by fire and in saving lives.

BAKERIES AND CANDY FACTORIES

September 21, 1919. Salt Lake City, Utah. Vienna Bakery. 732 East 4th street, South. Bakery. Two 2-story buildings destroyed. Walls, brick and frame. Floors, lumber. Roofs, lumber, tar and gravel. Fire started under shed. Discovered by neighbor when fire broke through roof at about 1.30 a. m. Alarm, box and telephone. Duration, 2 hours. Stopped at oven room. Fire was favored by poor construction. Private fire apparatus, none. Means of escape, good. Value of buildings and contents, $75,000. Property loss, not reported to SAFETY ENGINEERING.

September 20, 1919. Youngstown, Ohio. Peter Cummings and Ritter & Myer. Federal and Phelps streets (101-5 West Federal street). Bakery and confectionery and clothing store. Two 2-story buildings. Ritter & Myer damaged only by water. Fire was confined to back room on 2d floor of building occupied by Peter Cummings. Walls, brick. Floors, wood. Roof, wood with tar paper and gravel. Cause, bake oven. Fire started on roof. Discovered by policeman at about 4 a. m. Alarm, telephone. Duration, 1½ hours. Fire was favored by floor being covered with grease and building being very old. Private fire apparatus, none. Means of escape, stairways. Value of buildings, $40,000; contents, $252,500. Property loss, $7,500; contents, $10,000.

CHEMICAL AND PHARMACEUTICAL WORKS

October 7, 1919. Baltimore, Md. Standard Wholesale Phosphate Company and Standard Acid Works. Foot of Beech street, Curtis Bay. One 3-story building and a number of 1-story sheds destroyed. Walls, iron and wood. Floors, cement. Roofs, frame covered with tar paper. Discovered by employes at about 1.14 a. m. Alarm, fire alarm system. Duration, 24 hours. Stopped at plant. Fire was retarded by fire walls. Firemen handicapped by lack of hydrants; only fire boats available, 40 minutes run to fire. Private fire apparatus, none. Injured, 2. Means of escape, stairway. No further information reported to SAFETY ENGINEERING.

COAL AND LUMBER YARDS

September 17, 1919. Canton, Ohio. Canton Lumber Company. 601-613 6th street, N. E. Lumber. One 1½-story building destroyed. Walls, wood. Floors, wood. Roof, slate. Cause, cigarette carried by workman. Fire started in lumber yard. Discovered by engineer at brewery at about 7.04 p. m. Alarm, telephone. Duration, 9 hours, Stopped at lumber yard: heat blistered other buildings, 9 in all. Fire was favored by wooden construction. Firemen handicapped by poor water pressure. Private fire apparatus, none. Injured, 1 (in helping to drag hose line, electric wire fell on him.) Value of building and contents, $20,000. Property loss, not reported to SAFETY ENGINEERING.

September 14, 1919. Hastings, Neb. Nye-Schnider-Fowler Company. Burtindon avenue, block 200. Lumber yard. Five 1-story sheds destroyed. Walls, lumber. Floors, part lumber. Roofs, shingles. Fire started about 50 feet from office. Discovered by man going home at about 11.50 p. m. Alarm, man reported fire in person. Duration, 7 hours. Stopped in same block. Fire was favored by construction of buildings and contents. Private fire apparatus, none. Means of escape, all open. Value of buildings and contents, $50,000 to $60,000. Property loss, not reported to SAFETY ENGINEERING.

September 12, 1919. Louisville, Ky. Edward J. Hackett Coal Company. Water street, between 3d and 4th streets. Coal tipple. One 3-story building destroyed. Walls, wood. Floors, wood. Roof, wood. Cause, spark from locomotive. Fire started on 2d floor. Discovered by citizen at about 5.30 a. m. Alarm, box. Duration, 5 hours. Stopped at 1st and 2d floors. Fire was favored by construction of building; railroad track ran through building, both ends open. Means of escape, elevated railroad on side of building. Value of building and contents, $15,000. Property loss, $15,000.

September 5, 1919. Seaside, Ore. Seaside Sash and Door Factory. Avenue I and 1st street. Wood yard (formerly sash and door factory). One 2-story building destroyed. Walls, wood. Floors, wood. Roof, patent roofing. Discovered by railroad watchman at about 4 a. m. Alarm, whistle of locomotive. Duration, about 1 hour. Confined to building of origin. Fire was favored by fine dust. Private fire apparatus, none. Means of escape, all kinds. Value of building and contents, $1.000. Property loss, not reported to SAFETY ENGINEERING.

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COLD STORAGE AND ICE PLANTS

October 3, 1919. Freeport, Texas. Malory Ice Plant. Block 700, Braord street. Manufacturing of ice. One 1-story building destroyed. Walls, wood. Floor, dirt. Roof, wood. Cause, leak in oil fuel line. Fire started under boilers in boiler room. Discovered by engineer in charge of plant at about 9.30 a. m. Alarm, telephone. Duration, about 1 hour. Confined to boiler room. Fire was favored by construction of building. Firemen handicapped by inadequate apparatus. Private fire apparatus, one 40-gallon chemical tank. Value of building and contents, about $10,000. Property loss, not reported to SAFETY ENGINEERING.

COTTON GINS

October 5, 1919. Sherman, Texas. Birge Forbes Company. 615 East Houston street. Cotton gin. One 2-story building destroyed. Walls, tin. Floors, wood. Roof, tin. Discovered at about 6.15 p. m. Alarm, telephone. Duration, 30 minutes. Value of building and contents, $8,000. Property loss, $5,000.

September 18, 1919. Blakely, Ga. Union Seed and Fertilizer Company. Cotton gin. One 2-story building destroyed. Walls, galvanized sheet iron. Floors, wood. Roof, sheet iron. Cause, spark while ginning. Fire started in the gins. Discovered by employes at about 2.30 p. m. Alarm, whistle. Duration, 1½ hours. Stopped at gin. Nearest building, 60 feet distant. Firemen handicapped by low water pressure. Means of escape, regular openings of gin. Value of building and contents and property loss, not reported to SAFETY ENGINEERING. A merchant of Blakely says in a letter to SAFETY ENGINEERING: "This fire was like most cotton gin fires—all over in a short time. I don't thing water pressure would have had any effect on this particular fire—only to have kept a few shingles from catching fire on a near-by negro dwelling. When water pressure is insufficient to enable those who are fighting fire to reach building on account of the heat, the fire-fighters are certainly handicapped. There is no organized fire department here."

September 14, 1919. Meridian, Texas. Combs & Son. Cotton gin. Four 1-story buildings destroyed. Walls, corrugated iron. Floors, wood. Roofs, iron. Fire started in gin proper. Discovered by passersby at about 12 a. m. Alarm, telephone. Duration, 2 hours. Stopped when buildings were consumed. Fire was favored by construction of buildings; wind was also favorable for spread of fire. Firemen handicapped by lack of near-by hydrants. Private fire apparatus, none. Value of buildings and contents, $10,000. Property loss, $2,500.

COTTON WAREHOUSES

September 21, 1919. Augusta, Ga. David Nackman. 820 Reynolds street (north side of city). Waste mill and cotton warehouse. One 2-story building partially destroyed. Walls, brick. Floors, wood. Roof, tin. Cause, supposed spontaneonus combustion. Fire started on 2d floor in waste mill. Discovered by watchman at about 7.25 p. m. Alarm, Gamewell system. Duration, about 2 hours. Stopped at the compartment where it originated. Fire was favored, as building was not equipped with sprinkler and fire walls. Firemen handicapped by delayed alarm on account of it being Sunday. Private fire apparatus, none. Persons in building, 1 (watchman). Means of escape, doors and windows. Value of building and contents, $60,000, estimated. Property loss, $20,000. Remarks by fire chief: "Second floor enclosed with fire shutters (no ventilation). Loose cotton on floor area about 9,000 square feet. Dust and lint caused an explosion, blowing out rear brick wall 10 feet high and 80 feet in length."

September 17, 1919. Augusta, Ga. S. M. Whitney & Co. 1 and 3 Eighth street. Cotton factors. One 1-story building damaged. Walls, brick. Floor, cement. Roof, tin. Fire started in warehouse. Discovered by employe at about 7.55 p. m. Alarm, Gamewell system. Duration, about 1½ hours. Stopped at the compartment in which it originated. Fire was retarded by sprinklers and fire walls. Private fire apparatus, buckets and barrels. Means of escape, doors. Value of building and contents, $35,000, estimated. Property loss, $1,500.

DEPARTMENT STORES

August 31, 1919. Santa Ana, Cal. Reinhouse Bros. 202 East 4th street. Dry goods and shoes. One 2-story building damaged. Walls, brick and wood. Floors, wood. Roof, tin. Fire started in shoe department. Discovered by passersby at about 10.48 p. m. Alarm, telephone. Duration, 25 minutes. Stopped in room where it originated. Fire was favored because of vent pipes in partition which ran to roof; fire stops were out to make room for the pipes. Private fire apparatus, none. Persons in building, about 50 in dance hall on 2d floor. Means of escape, stairs in front and rear of building. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $2,500.

DWELLINGS, ORDINARY, CITY

October 4, 1919. Philadelphia, Pa. Edw. V. Kane. 6514 Lincoln drive, Germantown. Dwelling. One 3½-story building damaged. Walls, stone. Floors, wood. Roof, slate. Fire started in attic. Discovered by occupant at about 9.03 p. m. Alarm, telegraph. Duration, 3 hours. Fire extended to 2d floor. No further information reported to SAFETY ENGINEER.

DWELLINGS, ORDINARY, COUNTRY

October 1, 1919. Shirley, Me. Mrs. Corcas Mitchell. Main street. Dwelling. One 1½-story building destroyed. Walls, wood.

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Floors, wood. Roof, shingles. Cause, lightning. Fire started in barn. Discovered at about 5.30 p. m. Duration, 3 hours. Private fire apparatus, none. Persons in building, 2. Value of building and contents, $2,000. Property loss, $2,000.

FOUNDRIES AND MACHINE SHOPS

October 3, 1919. Burlington, N. C. Sykes Foundry. End of Maple street. Foundry. One 1-story building destroyed. Walls, wood. Floor, dirt. Roof, composition. Fire started at furnace. Discovered by neighbor at about 3 a. m. Alarm, telephone. Duration, 2 hours. Firemen handicapped by distance of fire. Private fire apparatus, none. Value of building and contents, $2,000. Property loss, $2,000. Valuable papers, records and correspondence were in adjoining building.

September 12, 1919. Petoskey, Mich. Burnett Foundry. 316 State street. Foundry and machine shop. One building partly destroyed. Foundry, 1-story high; machine shop, 2 stories. Walls, portion good, part poor. Floors, foundry, dirt; machine shop, wood. Roofs, gravel and composition. Cause, foundry stack inside building. Fire started near stack. Discovered by owner of foundry at about 8.30 p. m. Alarm, Gamewell system. Duration, 2 hours. Stopped at machine shop. Private fire apparatus, none. Persons in building, 6 or 8. Means of escape, all kinds. Value of building and contents, $1,500. Property loss, $500 or $600.

GARAGES AND AUTO REPAIR SHOPS

September 27, 1919. Seattle, Wash. Rear 24 West Mercer street, "North Seattle" district. Small "rent" garage. One 1-story building, partially destroyed, 3 automobiles damaged. Walls, frame. Floor, frame. Roof, frame. Cause, cigarette. Fire started in garage, on or near floor. Discovered by passerby at about 7.35 a. m. Alarm, box. Duration, a few minutes. Confined to building. Fire was favored by construction of building—only an open shell. Private fire apparatus, none (unless Pyrenes in autos). Value of building, $500; 3 automobiles, $4,000. Property loss, $1,600.

September 25, 1919. Indianapolis, Ind. Horace T. Woods Transfer Company. 214-216 North Meridian street. Auto transfer and storage. One building (3 stories in front, 1 story in rear) destroyed. Walls, brick. Floors, wood. Roofs, wood. Cause, gasoline explosion. Fire started in rear on main floor. Discovered by employe at about 12.40 p. m. Alarm, telephone. Duration, until 4.03 p. m. Confined to rear. Fire was favored because building was an old livery barn. Firemen handicapped by street to south being torn up for repairs. Private fire apparatus, Firefoam extinguishers. Persons in building, about 12. Means of escape, front and rear exits. Value of building, $45,000; contents, $200,000. Property loss, $19,696; contents, $53,724.

September 22, 1919. Chatham, Canada. Sam Lenover. Grand avenue. Garage. One 1-story building destroyed. Walls, frame. Floor, wood. Roof, shingle. Cause, short circuit. Fire started in automobile. Discovered by persons in street at about 10.15 p. m. Alarm, box 15. Duration, 15 minutes. Confined to garage. Fire was favored by construction of building. Value of building and contents, $800. Property loss, $800.

September 8, 1919. Grass Valley, Cal. Joseph Kneebone. Richardson and North Church streets. Public garage. Two 1-story buildings destroyed. Walls, corrugated iron (frame, wood). Floors, concrete. Roofs, frame covered by corrugated iron. Cause, dropping of gasoline torch on oil-soaked floor. Fire started at wood bench in rear of shop. Discovered by persons in building at about 5.15 p. m. Alarm, Gamewell Fire Alarm System. Duration, ¾ hour. Stopped at adjoining building. Fire was retarded to a certain extent by corrugated iron; spread to adjoining building owing to unprotected windows. Private fire apparatus, one Pyrene hand extinguisher. Persons in buildings, 5. Value of buildings and contents, about $2,500. Property loss about $2,500.

GENERAL STORES

October 3, 1919. Utica, N. Y. Frank Juliano, 541 Bleecker street. Dry goods store. Three stories high. Walls, brick. Floors, wood. Roof, slag. Fire started in back part of store. Discovered by passerby at about 10.31 p. m. Alarm, telegraph. Duration, 10 minutes. Confined to store. Private fire apparatus, none. Persons in building, about 30. Means of escape, 1 stairway, 1 fire escape. Value of building and contents and property loss, not reported to SAFETY ENGINEERING.

September 23, 1919. Birmingham, Ala. Guarantee Shoe Company. 1905 Third avenue. Retail shoes. Three stories high. Walls, brick. Floors, wood. Roof, tar and gravel. Cause, supposed incendiary. Fire started in rear of 3d floor. Discovered by policeman at about 12.55 a. m. Alarm, box. Duration, 45 minutes. Stopped at 3d floor. Fire was favored by construction of building. Private fire apparatus, none. Means of escape, fire escapes. Value of building and contents, $230,000. Property loss, $30,000.

September 12, 1919. Ionia, Mich. G. W. French and T. R. Buck. West Maine street. Jewelry store and clothing store. Two 2-story buildings destroyed. Walls, brick. Floors, wood. Roofs, sheet iron and gravel. Cause, smoke house across alley. Fire started in smoke house. Discovered by night watchman at about 12.30 a. m. Alarm, box. Duration, until 10 a. m. Stopped in basement. Private fire apparatus, none. Means of escape, stairways. Value of buildings and contents, $60,000. Property loss, $20,000.

September 12, 1919. Seattle, Wash. Whiton Hardware Co. 108 First avenue, South.

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southern part of business district. Hardware. Three buildings, 6, 4 and 4 stories, damaged; one about 50 per cent; two adjoining, occupied by same firm, slightly by water. Walls, brick. Floors, wooden joist. Roofs, wood. Fire started in rear center basement about packing table. Discovered by watchman at about 3.37 a. m. Alarm, box. Duration, several hours. Stopped in building of origin. Fire was favored by open elevator shafts and stairways, which the fire marshal had tried for years to get enclosed; contract had been let for this work. Private fire apparatus, extinguishers; not used. Person in building, 1 (watchman). Injured, several firemen, slightly. Means of escape, fire escapes. Value of buildings, $70,000; contents, $386,000. Property loss, $35,000; contents, $190,000.

GRAIN ELEVATORS

September 13, 1919. North Kansas City, Mo. Murray Grain Elevator. Grain elevator. One 12-story building destroyed. Walls, steel frame and tile. Floors, concrete and tile. Roof, concrete and tile. Cause, grain dust explosion. Fire started presumably in basement. Discovered when explosion occurred, about 2.40 p. m. Alarm, telephone. Duration, 18 hours. Confined to building. Fire was retarded by construction of building. Firemen handicapped by isolated position of building, located 1¼ miles from hydrant. Private fire apparatus, none. Persons in building, about 40. Killed, 14. Injured, 11. Means of escape, fire escape. Value of building and contents, $2,500,000. Property loss, $600,000.

HOSPITALS AND SANITARIUMS

September 20, 1919. Point Grey, B. C. Shaughnessy Military Convalescent Hospital. Twenty-seventh and Willow streets. Military hospital. One 3-story building partly destroyed. Walls, wood and stucco. Floors, wood. Roof, wood. Fire started in roof. Discovered by a patient at about 11 a. m. Alarm, telephone. Duration, about 6 hours. Stopped at floor of 3d story. Fire was favored, as attic was open from one end to the other. Firemen handicapped by tardiness in sending in alarm. Private fire apparatus, hose ready for use, every 150 feet throughout building. Persons in building, about 50. Means of escape, fire escapes on either end and 2 wide stairways inside. Value of building and contents, $95,000. Property loss, $30,000, estimated.

OIL WORKS AND TANKS

September 19, 1919. Tulsa, Okla. Harvey Young Oil Company. Archer and Elgin streets. Oil and gas storage. One 7-story building destroyed. Walls, sheet iron. Floors, wood. Roof, sheet iron. Fire started in storage. Discovered by passersby at about 8.45 p. m. Alarm, box and telephone. Duration, 3 hours. Confined to building of origin. Fire was retarded by sheet iron walls and roof. Private fire apparatus, none. Value of building and contents, $40,000. Property loss, $7,000.

September 18, 1919. Lusk, Wyo. Buck Creek Oil Company. Oil production. Tanks destroyed. Cause, lightning. Fire started in tanks used in receiving oil from wells. Discovered at once. Duration, until oil was consumed. Private fire apparatus, none. No further information reported to SAFETY ENGINEERING.

RAILROAD PROPERTY

September 12, 1919. Los Angeles, Cal. Southern Pacific Railway coach and paint shop. Alhambra road. Railway paint shop. One 1-story building destroyed. Walls, brick. Floor, cement. Cause, supposed spontaneous combustion. Fire started in east end of building, in or near workmen's lockers. Discovered by employes about 5.35 p. m. Alarm, telephone and box. Stopped when building was consumed. Fire was favored because the contents, newly varnished cars in hot, unventilated building, were very inflammable. Whole place was ablaze when firemen arrived. Private fire apparatus, 3-gallon Babcocks. Means of escape, ample. Value of building and contents, $175,000. Property loss, $175,000.

September 10, 1919. Los Angeles, Cal. Pacific Electric Company. West of Alameda, between 7th and 8th streets. Warehouse of electric railway. One 2-story building destroyed. Walls, brick. Floors, wood. Cause, supposed spontaneous combustion. Fire started near workmen's lockers. Discovered by night watchman at about 1 a. m. Alarm, telephone. Fire went through the building. Fire was favored because of unprotected windows, wooden floors, wooden patterns, rubber, electrical goods. Firemen handicapped because alarm box did not come in and alarm did not reach fire department for about 15 minutes. Means of escape, ample. Value of building and contents, $250,000. Property loss, $190,000.

SCHOOLS AND COLLEGES

September 20, 1919. Birmingham, Ala. Tuggle Institute. Twelfth avenue and 9th street, North. School and dormitory. Three 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, wood. Fire started upstairs. Discovered by occupants at about 9.35 p. m. Alarm, telephone. Duration, 4 hours. Stopped when buildings were consumed. Fire was favored because of wooden construction. Private fire apparatus, none. Persons in building, about 84. Means of escape, stairway. Value of building and contents, $18,000. Property loss, $18,000.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

A NEW HOUSE ENTRANCE SWITCH

It is now becoming generally recognized that the unprotected knife switch is too dangerous to be used in places where it can be handled by careless and ignorant persons, especially in the home where it can be reached by children. The best modern wiring practice, therefore, demands the use of safety switches in such locations.

The new Westinghouse WK 53 switch has been designed to meet this demand. It is perfectly safe to operate; the fuses can be renewed only when they are dead; unauthorized persons cannot reach live parts; and the switch can be locked open if desired. At the same time its construction is simple and its cost very low. It is supplied in a 30-ampere, 125-volt size and is especially adapted for house-entrance service, but it can also be used to advantage in place of an open knife switch for any purpose within its capacity.

Westinghouse WK 53 House Entrance Switch

View of Interior

The switch, which is of the knife type, is mounted together with two plug fuses on a porcelain base and is enclosed within a steel box. It is operated by a projecting handle and opens with a quick break, no matter how slowly the handle may be operated.

The cover of the box consists of two parts, hinged together. The upper part, which covers the knife switch, is held in place by screws. The lower part forms a door, which gives access to the fuses. It is, however, impossible to open this door unless the switch is in the off position, when the fuses are dead. If the switch is closed when the door is open, the door closes also; and a barrier prevents access to the switch and terminals from the fuse compartment. Hence there is no possible way (short of damaging the switch) of getting a shock when renewing the fuses.

The upper part of the cover can be protected by a seal and the handle can be locked in the off position by a padlock. Unauthorized persons can, therefore, be prevented from getting at the live parts and also from closing the switch. These features are valuable safeguards in any service, but appeal especially to central stations, as they prevent theft of the current.

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NO. 7 CHAMPION CHEMICAL ENGINE

The American-LaFrance Fire Engine Company's new forty gallon chemical fire engine has recently been approved and awarded the label of the Underwriters' Laboratories. This engine will be known to the trade as No. 7 Champion.

It has many safety and efficiency features which commend its use. The tank head is securely riveted and the tank collar bolted solidly to the tank shell. The heavy galvanized drawn-steel cylinder is impervious to corrosion, and is built to withstand a test pressure of 1000 pounds per square inch, whereas the normal working pressure is from 75 to 150 pounds per square inch.

The No. 7 Champion Chemical Engine

The cage which contains the acid jar is designed to permit free circulation of the acid and more rapid action when the engine is operated. The acid receptacle is of a special acid-resisting metal alloy. A glass neck screwed into the receptacle affords a durable non-sticking seat for the heavy lead stopper. A special extra-heavy chemical hose is furnished. The cap of the chemical tank is also of extra heavy construction.

To operate the No. 7 the engine is tipped forward till the top rests on the ground. This allows the loose stopper in the acid jar to drop out and permit the acid to mix with the soda water solution in the tank. The resulting action is infallible and instantaneous. The soda and acid type of chemical engine is particularly effective on fires in free-burning material.

The No. 7 is built narrow so that it can be wheeled through doors and aisles. The large wheels and careful balance make it easy to move and operate. It is attractively finished in English Vermillion, with polished brass trimmings. The net weight of the complete engine is 338 pounds.

The company has prepared an attractive color circular descriptive of this engine, copies of which may be had for the asking.

THE LYON BREATHING MACHINE

The Lyon Breathing Machine is the result of many years of experience of the Lyon Manufacturing Company in the manufacture and sale of resuscitating devices.

It combines all the recognized principles of resuscitating devices already on the market, together with exclusive features, found only in this device. It embodies all the primary points both mechanical and physiological which are vital to the successful application of mechanical breathing devices.

In the matter of mechanical construction, the most minute care has been given with the end always in view of effectiveness, strength, appearance and durability. The Lyon Breathing Machine is constructed entirely of aluminum. It is impervious to the action of chemicals, will not tarnish, rust or corrode.

It can be taken apart, sterilized and reassembled in five minutes by anyone, under any condition, without any tools.

The device is already assembled for instant use, no connections or attachments need be made. A dial plate upon the top of the breathing machine shows the different ages in size and the number of inhalations that the particular patient breathes per minute, so that to vary the volume one has but to place the indicator upon the age or size on the dial and operate the device.

Since pure air has been recognized by the most eminent medical authorities familiar with resuscitation as amply sufficient under nearly every condition, the Lyon Breathing Machine has been constructed with the view of administering air.

While oxygen may under some conditions be deemed necessary, yet, the time consumed by inexperienced operators in making the connections is of such vital importance that if air alone were administered, the patient would have a much better chance of recovery. If, however, oxygen is desired, the small valves at the base of the Lyon Breathing Machine can be so regulated as to administer it in any quantity from any ordinary oxygen container or generator.

The machine is of such weight and strength in construction to guarantee stability through

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handling. This is especially a desirable quality since the majority of these devices are in the hands of inexperienced operators.

It is provided with a face mask of sufficient size to thoroughly cover the mouth and nasal openings, guaranteeing a proper admission of air into the lungs.

HOLCOMB SAFETY GARMENTS

In spite of the danger of splashing molten metal from the ladle foundry workers wearing fireproof clothing, such as that manufactured by the Holcomb Safety Garment Company, are protected against burns and scalds.

Holcomb Asbestos Mitten

The Holcomb Safety Garment Company's garments are made of Canadian Crysolite asbestos. The selected crude is spun into yarns and woven into a special twilled cloth. The cloth is then treated by a special process which makes a smooth, pliable and absolutely fireproof material, and also prevents the nap from rubbing rough.

The garments include gloves, mittens, aprons, suits, leggins, etc., some of which are also made of leather and fireproof duck. Workmen protected by such clothing are turning out larger quantities of work without fear of accidents.

The Holcomb Safety Garment Company have listed among their customers some of the largest foundries in the country. The manufacturer will be glad to send a catalog describing these products to anybody who is interested. All requests should be addressed to the manufacturer at 14 South Jefferson Street, Chicago, Ill.

An Asbestos Glove

A Popular Type of Leggin

BOWSER OIL STORAGE TANK SYSTEM

A pamphlet describing and illustrating its system of oil storage tanks has been issued by S. D. Bowser & Co., Inc., Fort Wayne, Ind., pioneer in the manufacture of improved oil handling devices and the original patentee and manufacturer of the famous Bowser self-measuring hand and power driven pumps, large and small tanks, gasoline and oil storage and distributing systems, self-registering pipe line measures, oil filtering and circulating systems.

Upon receiving the barrels of oil from the oil company the oils are emptied by gravity into the leakproof storage tanks. The oil gauge on the tank tells the approximate number of gallons contained in the tank, thereby checking up short barrels and invoicing mistakes. The easy one-man Bowser method of emptying barrels with the cradle and dash drains the barrel completely.

There is an average of 22 square feet of porous wood in a wooden barrel and when the oil is stored in such a container several gallons are soaked up and absorbed by the wood, thus constituting a dangerous fire hazard. The steel walls of the Bowser tank eliminate this hazard.

Where jigger cans are used, grit and dirt will contaminate the oil and perhaps cause serious engine trouble The Bowser tanks and pumps are dirt, grit and dust-proof, and will keep the oil in its original state of purity.

This class of equipment is made in strict compliance with the requirements and wishes of the National Board of Fire Un-

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derwriters, and through its use there will be a material reduction in the fire hazard. There will be no oil-coated floors, dripping faucets or dirty funnels and measures. Such equipment provides cleanliness, efficiency and economy.

Readers desirous of receiving further particulars should address a request to the manufacturer.

U. S. AUTOMATIC SPRINKLER COMPANY

The United States Automatic Sprinkler Company, manufacturer and contractor of approved automatic sprinkler apparatus, announces that it has extended its organization to handle installations of sprinkler equipment in factories and loft buildings in any part of the country. The company invites inquiries from owners, builders and architects. Its office is at 1390-4 Lexington avenue, New York.

SURTY CONE BELT SHIFTER

Accident statistics show that thousands of workers have been incapacitated by having their thumbs torn off, or arms mangled and twisted out of shape in adjusting the speed of cone driven machines.

These accidents all belong to the preventable class and could have been prevented if an efficient, safe and fool proof belt shifter were used on the machines.

Before a belt shifter can be approved and labeled as such by the Underwriters' Laboratories it must comply with the following requirements:

(1) Device should operate positively and promptly at all times without any necessity of operator touching the belt with his hand.

(2) Device should be such that the operator can quickly manipulate any change of speed of belt required, from his normal working position at machine, obviating any necesity of his approaching the belt.

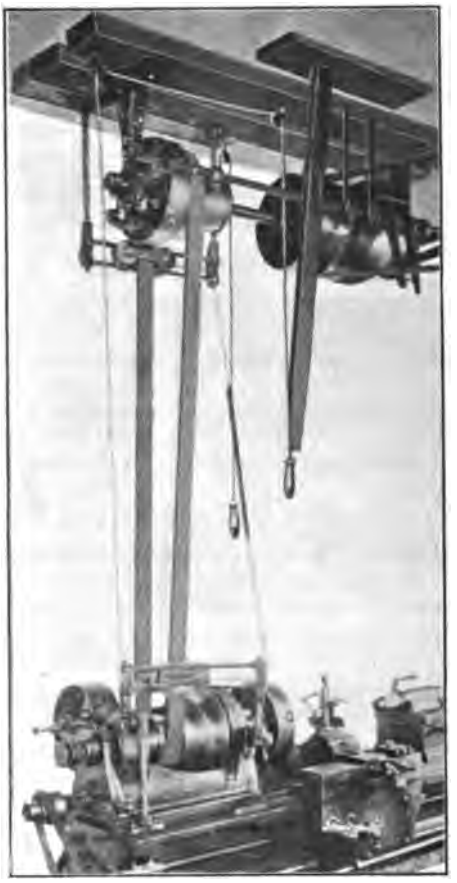
(3) Device should be so constructed as to cause the least possible wear or fraying of the edge of the belt.

(4) It should be possible to guard the belt with mesh material and leave no necessity for operator to open the guard, except for making immediate repairs.

The Surty Cone Belt Shifter illustrated in this article has passed the above requirements and was awarded the Underwriters' Laboratories label of approval.

A cone driven machine equipped with such a belt shifter is made equal in production to any selective gear drive, at much less first cost and more economy of workmen's time. It reduces the fatigue of the operator, also eliminates the possibility of accident.

The Surty cone belt shifter will instantly throw the belt from high speed to low, or low to high or to intermediate step, without the operator leaving his working position. In the hands of a workman who senses the need of more or less speed, it adds to the output of machine. The belt shifter can be applied to all lathes, milling machines, shapers and drill presses.



The Surty Cone Belt Shifter

The Surty Cone Belt Shifter is also made for engine lathes so the workman can regulate the speed from any one of a number of points, and is so sturdily designed and constructed that it should possess a long period of usefulness.

REFILLING FIRE EXTINGUISHERS

Under the title of "Safety Always", James M. Castle Inc., has issued a very interesting folder descriptive of Castle Liquid for which they claim superiority as a fire extinguishing agent, the required low freezing point, full electrical resistance and that it is non-corrosive and non-damaging.

The absence of chloroform from the compound removes one of the dangers which has attended the use of certain forms of extinguishers in confined spaces and a uniformity of composition seems to be assured by the trade-marking of the product.

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UNDERWRITERS' LABORATORIES

established and maintained by the

NATIONAL BOARD OF FIRE UNDERWRITERS

For Service—Not Profit

examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

HIGH-PRESSURE GAS GAUGE—Fidelity Brass Mfg. Co., Submittor, 1001-11 W. Washington Blvd., Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—General Welding & Equipment Co., Submittor, 107 Massachusetts Ave., Boston, Mass.

HIGH-PRESSURE GAS GAUGE—Heidbrink Co., The, Submittor, 525 S. Fourth St., Minneapolis, Minn.

HIGH-PRESSURE GAS GAUGE—Imperial Brass Mfg. Co., The, Submittor, 524 S. Racine Ave., Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—K-G Welding & Cutting Co., Inc., Submittor, 556 W. 34th St., New York, N. Y.

HIGH-PRESSURE GAS GAUGE—National Gauge Equipment Co., Mfr., LaCrosse, Wis.

HIGH-PRESSURE GAS GAUGE—Oxweld Acetylene Co., Submittor, Newark, N. J.—Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—Russ Co., The, Submittor, West 58th and Walworth Ave., Cleveland, Ohio.

HIGH-PRESSURE GAS GAUGE—Superior Oxy-Acetylene Machine Co., Submittor, East High and Canal Sts., Hamilton, Ohio.

HIGH-PRESSURE GAS GAUGE—Torchweld Equipment Co., Submittor, 224 N. Carpenter St., Chicago, Ill.

HIGH-PRESSURE GAS GAUGE—United States Gauge Co., Mfr., 67 Wall St., New York, N. Y.

HIGH-PRESSURE GAS GAUGE—Victor Oxy-Acetylene Equipment Co., Submittor, 884-86 Folsom St., San Francisco, Cal.

HOLLOW METAL FIRE WINDOW FRAMES—American Sheet Metal Works, Mfr., Carrollton Ave. and Edinburgh St., New Orleans, La.

HOLLOW METAL FIRE WINDOW FRAMES—British Columbia Ceiling & Roofing Co., Ltd., 523 Seventh Ave., West, Vancouver, B. C.

HOLLOW METAL FIRE WINDOW FRAMES—Pacific Sheet Metal Works, Mfr., 1129 Howe St., Victoria, B. C.

LIGHTNING ARRESTERS—General Electric Co., Mfr., Schenectady, N. Y.

MEDIUM BASE SOCKETS—Cole & Co., Henry, Submittor, 54 Old Colony Ave., Boston, Mass.

MOTION PICTURE MACHINES—Master Machines Tool Co., Inc., Mfr., 2638-40 Park Ave., New York, N. Y.

OIL-BREAK SWITCHES—Mushet Co., W. E., Mfr., 502 Mission St., San Francisco, Cal.

PANELBOARDS—Starrett Mfg. Co., Mfr., 523 S. Green St., Chicago, Ill.

PANIC BAR LATCH RELEASE—Peters & Son, James, Mfr., 1924-38 N. Front St., Philadelphia, Pa.

PLUG FUSE CUTOUT BASES—Gordon Electric Mfg. Co., The, Mfr., Waterville, Conn.

PLUG FUSE CUTOUT BASES—Ward Electric Co., Submittor, 1411 Walnut St., Philadelphia, Pa.

RECEPTACLE FOR ATTACHMENT AND PLUG—Oliver Electric & Mfg. Co., Mfr., 4221 Forest Park Blvd., St. Louis, Mo.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Ward Electric Co., Submittor, 1411 Walnut St., Philadelphia, Pa.

RECEPTACLES FOR ATTACHMENT PLUGS AND PLUGS—Union Elec. Co., Mfr., Trenton, N. J.

REDUCING VALVES, HIGH-PRESSURE GAS—Air Reduction Sales Co., Submittor, 120 Broadway, New York, N. Y.

REDUCING VALVES, HIGH-PRESSURE GAS—Burdett Mfg. Co., Submittor, St. John's Ct. at Fulton St., Chicago, Ill.

REDUCING VALVES, HIGH-PRESSURE GAS—Carbic Mfg. Co., Submittor, Duluth, Minn.

REDUCING VALVES, HIGH PRESSURE GAS—The Davis-Bournonville Co., Mfr., New York, N. Y., and Chicago, Ill.

REDUCING VALVES, HIGH-PRESSURE GAS—Federal Brass Works, Mfr., 3100 S. Kedzie Ave., Chicago, Ill.

REDUCING VALVES, HIGH-PRESSURE GAS—General Welding & Equipment Co., Submittor, 107 Massachusetts Ave., Boston, Mass.

REDUCING VALVES, HIGH-PRESSURE GAS—K-G Welding & Cutting Co., Submittor, 566 W. 34th St., New York, N. Y.

REDUCING VALVES, HIGH-PRESSURE GAS—Nageldinger & Son, Inc., John, Mfr., 407-409 E. 91st St., New York, N. Y.

REDUCING VALVES, HIGH-PRESSURE GAS—Oxweld Acetylene Co., The, Mfr., Chicago, Ill., and Newark, N. J.

REDUCING VALVES, HIGH-PRESSURE GAS—The Prest-O-Lite Co., Inc., Submittor, Indianapolis, Ind.

REDUCING VALVES, HIGH-PRESSURE GAS—The Bastian & Glessing Co., Mfr., 125 W. Austin Ave., Chicago, Ill.

REDUCING VALVES, HIGH-PRESSURE GAS—Superior Oxy-Acetylene Machine Co., Submittor, 1102 E. High St., Hamilton, O.

REDUCING VALVES, HIGH-PRESSURE GAS—Torchweld Equipment Co., Submittor, Fulton and Carpenter Sts., Chicago, Ill.

REDUCING VALVES, HIGH-PRESSURE GAS—Universal Regulator Co., Submittor, 775-79 Communipaw Ave., Jersey City, N. J.

REDUCING VALVES, HIGH-PRESSURE GAS—Wm. Crowell Co., Submittor, 775-79 Communipaw Ave., Jersey City, N. J.

SHEET METAL FIRE WINDOW MULLIONS—Campbell Architectural Iron Co., Inc., Mfr., Albany, N. Y.

SIGNALING SYSTEMS—Holtzer-Cabot Electric Co., The, Mfr., Roxbury, Boston, Mass.

SLIDING AND SWINGING SHEET METAL FIRE WALL DOOR—St. Louis Fire Door Co., Mfr., 15th and Clark Ave., St. Louis, Mo.

SLIDING AND SWINGING SHEET METAL FIRE WALL DOOR—Variety Mfg. Co., Mfr., Carroll and Sacramento Aves., Chicago, Ill.

SLIDING AND SWINGING, TIN-CLAD, FIRE WALL DOOR—British Columbia Ceiling & Roofing Co., Ltd., 523 Seventh Ave., West, Vancouver, B. C.

SLIDING AND SWINGING, TIN-CLAD, FIRE WALL DOORS—Carmichael Waterproofing Co., Mfr., 918 Palmerston Ave., Toronto, Can.

STUD AND LINE VALVES, HIGH-PRESSURE GAS—International Oxygen Co., Mfr., 79 Freylinghuysen Ave., Newark, N. J.

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Safety Engineering

Vol. 38 DECEMBER, 1919 No. 6
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The New York Industrial Safety Congress

THE Fourth Annual New York State Industrial Safety Congress convened in Syracuse on December 1 for a four days' session. The meetings were held in Mizpah Auditorium, and a large and representative exhibit by manufacturers was staged in the ballroom of the Onondaga Hotel.

MONDAY SESSION

The opening exercises were held on Monday afternoon. Immediately following a musical program of half an hour Walter R. Nichols, commissioner of public safety for the city of Syracuse, welcomed the congress on behalf of the mayor, who was unable to be present.

The opening address was delivered by the Hon. James M. Lynch, industrial commissioner and president of the congress. He reviewed the work of the three previous congresses, telling how the start had been made with the hazards existent in the building trades and had progressed through the formulating of codes for several industries.

Richard C. Stofer, president of the Associated Manufacturers and Merchants of New York State, spoke on "Safety From the Viewpoint of Organized Employers," and James P. Holland, president of the New York State Federation of Labor, spoke on the opposite side under the topic, "Safety From the Viewpoint of Organized Employes." Both speakers had many similar thoughts, so that on the subject of safety there seems to be practically no gulf between capital and labor.

In the absence of Channing Rudd, who was scheduled to speak on "Thrift, the 'Safety First' of Happiness," this subject was covered by the Hon. Regis H. Post, former governor of Porto Rico.

Miss Frances Perkins and Edward F. Boyle, members of the New York State Industrial Commission, made brief remarks.

Dr. R. M. Little spoke, in place of Dr. Charles A. Eaton, on "Americanism." He was very much at home on the subject, treating it in a broad way. He pleaded that no racial or sectional prejudice be permitted to dim the glory of the "Americanism" of the future, which was to be of no birth or breed, but was to be the embodiment of a deep mental and spiritual feeling which life in America was growing within those commonly thought of as aliens. He told of the wonderful service rendered by the foreign-born residents during the war, and he deplored the use of slighting terms such as "Hunkies," "Dagos," etc. Dr. Little's climaxes were applauded loudly.

TUESDAY SESSION

The second day, Tuesday, was designated "The Foreman's Day." W. H. Cameron was chairman. The opening paper, "The Modern Foreman," was by B. M. Nussbaum, vice-president of the Business Training Corporation, New York. The discussion was led by V. M. Palmer of the Eastman Kodak Company.

F. F. Morris, regional field secretary of the National Safety Council, spoke on "How the Foreman Can Win His Men to Safety." He told of the close personal relation which should exist between the workman and the foreman, who takes the place of the old-time superintendent of the small plant. The discussion was led by H. F. Doepke of the National Aniline & Chemical Company, Buffalo.

"What Every Foreman Should Know About Safeguarding" was a subject cov-

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ered by A. P. Cole, manager of the bureau of safety, Utica Mutual Insurance Company of Utica. He pointed out the necessity of getting the foreman to *want* the guard and partake in its design. Its maintenance would then be assured. He showed how, if the hazard was within 4 inches of the guard, the mesh should be small enough to prevent the insertion of a finger, and if within 15 inches the mesh need only prevent the insertion of an arm. Frank M. Ward of the Otis Elevator Company, Yonkers, led the discussion.

TUESDAY AFTERNOON SESSION

The Tuesday afternoon session started with J. A. Oartel's paper on "The Foreman's Relation to Shop Safety Committees." The paper advocated the hearty support of committees by the management and the careful regarding of recommendations from the men. M. H. Sterns, safety engineer of the Donner Steel Company, Buffalo, led the discussion.

Alexander McHamilton, secretary of the American Radiator Company, Buffalo, spoke on "The Foreman and the New Man." A great deal of importance, he said, attaches to this relationship, as the high percentage of accidents among

(*Continued on page* 353)

Safe Practice in Using Gas Masks

By A. C. Fieldner and S. H. Katz

Mr. Fieldner is Supervising Chemist and Mr. Katz is Assistant Physical Chemist, Pittsburgh Station, Bureau of Mines

THE Army-type gas mask has proved very essential in the chemical industries. Workmen need no longer put up with inadequate and partial protection against corrosive acid fumes, chlorine, bromine, oxides of nitrogen, ammonia, etc., by tying a moist towel or handkerchief over the mouth and nose.

The Army-type gas mask, with a suitably filled canister for the gas in question, provides complete protection for both lungs and eyes. However, the gas mask is not a cure-all for every gaseous atmosphere. It has serious limitations, which should be thoroughly understood by every user.

Following are some important recommendations which will aid materially in keeping the masks in good order and will lead to their use under proper and safe conditions:

1. Know the nature of the atmosphere in question so far as possible, and be certain that you have the proper canister (as shown on the label) before entering the gas. Following is a list of atmospheres where Army gas masks will not protect:

GAS OR ATMOSPHERE	WHERE FOUND	REMARKS
Methane.	May be found wherever natural gas is produced or used; also in coal mines.	No adequate absorbent is known. The gas is harmless in itself, but may cause suffocation when present in air in sufficient quantity to reduce the oxygen content below 13 per cent.
Atmospheres deficient in oxygen.	Flues, apparatus in industrial plants, mines and closed rooms in buildings after fires and explosions.	The wearer of a gas mask must have an adequate supply of oxygen in the atmosphere around him, to support life, regardless of the content of poisonous gas. For entering an atmosphere deficient in oxygen, the self-contained breathing apparatus, or helmet supplied with air from a pump through a line of hose, should be used.

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Atmospheres containing higher concentrations of any toxic gases.	Chemical and metallurgical apparatus. Rooms where large quantities of gas are evolved without adequate ventilation.	The gas mask is essentially an apparatus for removing toxic gases in comparatively low concentrations from air breathed, such as existed on the battlefield. Although there are exceptions, it may be said that unless special information as to the activity and capacity of a mask is available, it should not be used in toxic gases in excess of one or two per cent.
Carbon monoxide.	Products of incomplete combustion of coal, wood and most combustible matter. Producer gas, blast furnace gas and products of many chemical and metallurgical operations. Coal gas, water gas, after damp in mines after fires and explosions.	No adequate absorbent is available at present for this gas. The Army mask canister is useless against it. Since carbon monoxide is odorless and tasteless, and may give no warning effects, and because of its widespread occurrence, it is the most dangerous of all gases commonly met in civil life.

In addition to the above limitations for all gas masks, it should always be realized that canisters are now being produced commercially with absorbents which may have a high capacity for a single gas or class of gases and no absorbing power for other kinds. For this reason the purpose and capacity of the canister should be exactly understood by the wearer of a gas mask before he entrusts himself to it in a dangerous atmosphere.

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2. Read the label on the canister, and use it only for the gases indicated thereon.

3. Before entering a poisonous atmosphere, adjust the gas mask with care, and make sure of the tightness and fit by holding the hand over the lower canister opening and inhaling. If there are no leaks a vacuum should be maintained for at least 15 seconds.

4. Enter the suspected atmosphere cautiously; if a tickling sensation in the throat or irritation of the eyes is felt, retreat immediately to a safe place and readjust the mask to the face, or, if the face piece was tight, change the canister. This statement applies to irritating gases only; non-irritant gases, such as carbon monoxide, give no warning.

5. Never enter a room where a lantern will not burn; such atmospheres are likely to be suffocating from lack of oxygen. Oxygen breathing apparatus or air helmets must be used in atmospheres deficient in oxygen.

6. Always ventilate a confined place as much as possible before entering with a mask. A smoldering fire in such a place may have used up the oxygen and produced dangerous quantities of carbon monoxide, against which the ordinary gas mask furnishes no protection.

7. Do not use the Army gas mask for protection against blast furnace gas, producer gas, illuminating gas, coal gas, natural gas or any atmosphere containing carbon monoxide.

8. For hygienic reasons gas masks should not be worn by more than one person without sterilization of the face piece. They should be cleaned and sterilized after use by washing the mask in 2 per cent of lysol in a bucket of warm water, then hang the mask up to dry with the lysol solution adhering.

9. Wearers of gas masks should be given careful instructions in their use and maintenance and regular drilling in adjusting gas masks.

10. Remember that the rubber materials in the gas masks will deteriorate. They are best kept in a closed box to protect them from the action of light and moisture.

11. Regular inspections at least once a month should be made to detect deterioration of rubber, cuts and folding cracks. Valves and canisters should be inspected, and the mask tested for tightness and adjustment.

12. Keep extra closed canisters on hand for quickly replacing exhausted canisters.

13. Keep the canister closed when not in use, and avoid getting water into it; wet canisters must be discarded.

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Development of Factory Lighting

By George C. Ward

Inspector, State Industrial Commission

Proceedings of Fourth Annual New York State Industrial Congress

THE eye, optically considered, is simply an arrangement, like a camera, for projecting inverted real images of visible objects upon a screen made of nerve filaments, and is a wonderful instrument.

The retina is the sensitive part of the eye, and, while it is wonderful in its ability to recuperate, it is not advisable to strain it. In order, therefore, not to injure or fatigue the eye, the following points should be noted, which are conditions to be avoided in laying out a system for properly illuminating a factory workroom:

CONDITIONS TO BE AVOIDED

First.—Glare—bright lights shining directly in the eye, even though the angle is considerably out of the ordinary range of vision and one is not looking directly at the light. There is considerable difference of opinion concerning a mandatory minimum angle of glare. Light coming in large quantities from an unusual angle should be avoided. Certain parts of the retina are, through long use, trained and accustomed to receive light, while other parts are not prepared to receive strong light. In average daylight we receive a gentle light from a great many directions, mainly from above; if, therefore, a strong light falls on the retina in certain places, the retina is strained. Snow blindness is caused by a strong reflected light, coming from below at an unusual angle, producing not only great fatigue but sometimes temporary blindness. The inspector in the field should pay particular attention to conditions of glare and the removal of the same; lights should not be so placed that the rays from them, falling on a glazed or polished surface, such as writing paper, polished metal parts of machines, metal work in lathes or any highly polished surfaces used in the manufacturing or wrapping of articles of commerce, are regularly reflected into the eye of the operator or anyone working nearby, as in this case a picture of the light itself is formed on the retina which obliterates the images on the paper or the minute detail of the work being done.

Second.—A flickering light should be carefully guarded against, as the iris is unable to keep pace with the rapid fluctuations, and, consequently, too much and too little light alternately falling on the retina very quickly produces fatigue. Examples of this condition are a flickering open gas jet, met with very often by our inspectors in many small factories; arc lamps, operated with a 25 cycle alternating current; incandescent lamps, met with in certain sections of the State, supplied with current from a generator driven by the ordinary single cylinder gas engine.

Third.—Insufficient light strains the retina in its effort to see clearly, and sufficient light should always be insisted on by the inspector. All State codes of illuminating intensities give a minimum below which the luminous flux density on the plane in which the work is performed—whether horizontal, vertical or intermediate plane—shall not fall.

STATE CODES

The State codes of Wisconsin, Pennsylvania and New Jersey are made mandatory in their entirety, with the exception that existing installations in Wisconsin need not be brought up to the code standard until July, 1920. Oregon, Ohio and Massachusetts have codes in preparation. The rule No. 50 of the New York State code relating to the lighting of factories and mercantile establishments became effective July 1, 1918, being adopted by the State

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Industrial Commission in accordance with the requirements of Sections 51-A and 52 of the Labor Law. This gives the desirable illumination to be provided in roadways and yard thoroughfares, storage spaces, stairs and stairways, halls and hallways, passageways, aisles, exists, elevator entrances and cars. The table of minimum intensities for detailed industrial operations and processes in this State is tentative and the Commission has extended the time for its adoption to July 1, 1920, when after a year's experience and further tests by our special investigators and after public hearings it will be adopted as a code rule and become the law of the State.

SHARP CONTRASTS ARE INJURIOUS

Care should be taken to avoid a sharp contrast between a light colored or bright surface on which one is working and dark surroundings; too sharp a contrast is injurious, for the reason that the eye does not have an opportunity to adjust itself to the different conditions when glancing up from the work; on the other hand, a moderate change in the illuminations is good and rests the eye, because where the eye is focussed constantly and strongly on one thing, the eye requires a moderate change, both in the illumination and in the image on the retina, in order to give it an opportunity to recuperate. Oculists are constantly coming across cases of temporary or permanent injury to the eyes through neglect of one or more of the above precautions.

Lighting engineers in laying out a *large* plant take into consideration all of the above objectionable features and make suitable provisions to remedy them; they also take into consideration the proper color of the light to be used under certain conditions. but by far the larger number of factories in this State, and especially in Greater New York, are small shops with comparatively few lamps, the proprietors of which will never seek the services of a trained lighting engineer. It will be in these small shops and factories where the inspector will find some of the most objectionable features.

CAUSE AND EFFECT

Light should be regarded as a tool, and the effect produced by use of that tool, illumination. Light is a cause, illumination an effect. As it is impossible to do good, satisfactory work with a dull tool, so it is impossible to do good work with a dull light. As it is impossible to properly machine a part or turn a shaft with an improperly set tool, so it is impossible to do the best work with an improperly placed light, casting its rays in all directions but the specific direction wanted.

When you need a light for local illumination at a particular point, why waste it by throwing a gentle stream of light rays in all directions, especially when they can be absorbed by dark colored walls and ceilings? On the other hand, one would not think of directing the powerful current from a high power nozzle on a freshly planted flower bed, where a gentle diffused mist of water was necessary to protect the bed from destruction. So the light from a single unit high power lamp source should be modified, mellowed and directed by use of proper globes and reflectors, and made suitable for the use intended, just as the direction and character of a stream of water can be modified by the kind of nozzle used.

Our inspectors have many times noticed the increase in foot candle intensity at a working point on the horizontal plane. When the open, bare lamp was enclosed in a conical shade with an inner reflecting surface; conversely, our inspectors have demonstrated many times on the spot, in certain factories in this State, that a much lower wattage lamp, properly equipped with shades and reflectors and properly placed, would produce the same amount of foot candle illumination on the working plane that the higher wattage lamp, hanging in the open, unshaded and unprotected from glare, actually produced.

With the introduction of the higher power lamp units with their greater

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intensity of illumination, in the effort to produce more light, certain conditions were created which were both dangerous and insanitary; dangerous to life and limb, insanitary in that the effect on the general health through undue eye strain was adverse. Illuminating engineers have long recognized that the State should regulate and ameliorate such conditions by suitable laws and codes, which would safeguard the life, limb and eyesight of the worker.

AVOIDABLE ACCIDENTS

A large per cent of industrial accidents may be classed as avoidable, and 15 per cent of these are undoubtedly caused by defects of illumination. The records of the Travelers Insurance Company for 1910 show that 23.8 per cent of 91,000 accidents were caused by improper and inadequate illumination. Since that date, with the improvement made in old and new installations, that figure should show a great reduction. The British Government reports show that in winter, in passageways, stairways, elevated gangways and storage places, 40 per cent more men are hurt from falling and stumbling than in summer, due to faulty illumination. It has been shown in this country from collected data that in December and January the accident curve is 40 per cent greater than the normal curve for summer daylight.

There is another danger factor to be taken into consideration—the use of an unprotected electric lamp where inflammable materials are being handled and manufactured. Pieces of glass and hot particles from broken lamps might fall into light cotton batting, for instance, or in inflammable and explosive chemical mixtures and result in panic of employes, if nothing worse. Fine wire guards or double safety bulbs should be used in such cases.

ADVANTAGES OF UP-TO-DATE SYSTEM

In the few cases in which cost and output figures were kept by some factory managers under an old, inadequate lighting system, and under an improved up-to-date system, an increase in output of 15 per cent was noted, spoilage was greatly reduced, the excellence of workmanship on the particular product was increased, workmen made better wages and, when questioned, refused to return to the old system, although some of them protested when the change was first made.

In 93 plants investigated in Chicago, trebling the lighting intensities and using proper equipment increased production 15 per cent, with an increased coal consumption of but 9 per cent.

THE IDEAL SYSTEM

To sum up, I would say that the ideal system should combine general and local lighting designed to fit the needs of the particular room where it is to be used; a system that eliminates direct and reflected glare by proper placement and proper diffusion; a system that minimizes the loss of light by absorption in dark walls and ceilings; a system in which the lights are so placed that no black shadows are encountered and in which a uniform diffusion of the required intensity is spread over the entire area; a system in which local lights are used only where needed; and, lastly, a system that is periodically kept clean and in the best repair.

WORK OF INSPECTORS

In addition to all other routine work, our inspection force placed during the fiscal year July 1, 1918, to July 1, 1919, 7,427 orders relating to lighting; 880 of these were safety orders to provide sufficient light and 6,547 were orders to eliminate glare; 864 compliances were obtained for sufficient light and 5,644 to eliminate glare. The mercantile division of the Bureau of Inspection during the same period issued 157 orders relating to light and obtained 133 compliances. It was necessary to bring to the attention of the legal division but 2 per cent of this total, which shows that the factory owner is co-operating to a marked extent with our inspectors.

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What Constitutes Good Inspection?

By Lew R. Palmer

Director of Safety and Personnel, Equitable Life Assurance Society

Proceedings of Fourth Annual New York State Industrial Congress

"ETERNAL vigilance is the price of Safety."

Inspection is the backbone of prevention, and no speaker can treat the subject lightly. There are many classes of inspection: Government inspection, insurance inspection and plant safety organization inspection. As this is Safety Man's Day, I assume it was the desire of the program committee that the speakers direct their ammunition against a sector limited to plant safety, and I have accordingly confined this paper to that class of inspection.

TACT

Quite properly, tact has been given first place in consideration of the subject of good inspection. An inspector may have education, practical experience and ability, but unless he has tact he lacks the main essential of a good inspector.

Those of us who have done pioneer safety work learned at the outset that promoting safety was largely a matter of salesmanship, and a good salesman cannot be successful unless he is tactful. Safety must be sold from the top to the bottom—to the management and to the workmen.

I recall a discussion between a Pennsylvania factory inspector and a steel mill safety inspector, where the factory inspector could not understand how a certain division of a large steel plant had made such improvement in safeguarding and in accident prevention. According to the State inspector, he had never ordered a single safeguard installed but that, according to the men in charge of the division in question, it would "surely shut down the mill if installed."

The plant safety inspector claimed that it was very simple. He knew his man. He knew that he was an enthusiastic baseball fan, and in most cases the interview started with a discussion of the latest achievements of the local prospective pennant winner. Eventually, some of the accidents occurring in other departments would be discussed. The good records that had been made through team work in some rival mill or department would be commented upon, and the sporting blood of the superintendent in question would soon begin to circulate. Before the safety inspector had left the mill, one or more of the safeguards he had gone down to the mill to have installed had been recommended by the superintendent himself. In most instances it is far easier to get people to do things because they want to than because they have to. In this case the safeguard was installed in a remarkably short time, and woe be unto the foreman or workman responsible should the guard not be maintained in place.

It is stated that this superintendent of millwrights, responsible for the safety of several hundred men, working in extra-hazardous places, eventually carried away the all-year prize for the lowest department accident record of the entire plant, covering about 7,000 employes. Knowing all three men in question and the conditions involved, I do not hesitate to say that this is one of the best examples of the importance of tact, and what tact can accomplish, that has come to my knowledge.

APT OBSERVATION

Another element that should determine the proper selection of a safety inspector is the quality of apt observation. We have seen men who, on entering a factory or mill, could almost immediately perceive the good or bad conditions that existed. To be sure, this presupposes a knowledge of what good and bad conditions really are; but there is an element other than simple knowledge. It is the quality of quick apprehension that goes with a mind trained to concentrate.

Many of the real hazards in industry

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come from unsafe practices, and it requires a wideawake inspector to detect careless methods that in most cases are considered by the rank and file as merely a part of the day's work, and perhaps for a considerable time do not result in the serious or fatal accident that eventually is sure to follow.

A real inspector must be able to detect the weak link in the chain of operating methods, even though the foreman maintains that an accident has not occurred in the 25 years that he has run the machine.

COMPREHENSIVE, PRACTICAL RECOMMENDATIONS

We cannot expect to have comprehensive and practical recommendations from a safety inspector without sane judgment, and we could scarcely trust the important work of a safety inspector to a man who is not endowed with this prerequisite.

To be convincing, recommendations must be comprehensive, and, to the plant manager from Missouri, must be absolutely practical. This requires that our safety inspector shall not only be tactful and apt, but must have such training and practical experience as will enable him to justify his recommendations. He must be conversant with the standards of safeguarding and safe methods of operation in other plants and industries similar to those he is called upon to inspect, for it is much easier to convince the operating department that a safeguard is practical if you can give them first-hand knowledge of what has been done in a neighboring plant or one whose successful operation is admitted.

If the recommendation involves a considerable expenditure of money, alteration of equipment, or substitution of new for old, blue-prints and photographs, if obtainable, showing the device in actual operation, usually has the desired effect, and most assuredly will if the safety department is supported by a progressive management and an actual hazard exists.

In many instances, the correction of unsafe and unhealthy conditions can be combined with improved operating methods, which result in increased production. These factors, however, are not elements of inspection alone, but can also be charged as the engineer's duty in accident prevention. The inspector and the engineer must play the game together. There must be team work, for a careful study of the broad subject of inspection will soon prove to us that the work of the inspector out on the firing line—where equipment must not only be so designed as to protect the workmen, but also be practical of operation—and the experience gained by the inspector in studying such problems should not be lost sight of by the engineer.

The relative importance of different standards varies in every plant in accordance with the local risk factor, having in mind, also, the number of workers exposed. In one plant, such as a furniture factory, the woodworking hazard may predominate. In the rubber industry, the calendar rolls demand first consideration. In the steel industry, hot metal cranes, blast furnaces and skull crackers are nightmares to the steel mill safety inspectors and engineers. In the mining industry safe practices are recognized as of vital importance, and inspection, therefore, is of pre-eminent value.

In like manner, in the explosives industry good inspection, in order to insure safe practice, has reduced the accident frequency in this industry to a relatively low degree—a most commendable achievement when the character of the work is taken into consideration.

A textile plant may not be classed as extra-hazardous, but without good inspection of housekeeping methods, health conditions, safety conditions, including elevators and fire escapes, it cannot be classed as a good risk from any standpoint.

Although many of the industries carry peculiar hazards that require special standards, there are many hazards common to several separate industries or occupations.

For the new inspector just assuming his duties it might be well to suggest that he give attention to the following standards, which may prove of assistance to him in his important work:

First, he should know the safety standards required by law—for the best way to keep out from under the law is to keep ahead of it. Where the State

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Industrial Board has not provided adequate standards, the "Industrial Safety Standards" developed by the various compensation insurance companies in co-operation with the leading industrial States, which standards represent the nearest National standard existing today, are recommended as a guide to the safety inspector. The items covered in these standards are listed herewith:

SAFETY STANDARDS

Standard Railing
Standard Toe Boards
Fire Hazard
Floors
Floor Openings
Wall Openings
Stairs
  Stair Lighting
  Stair Treads
  Stair Hand Rails
Elevated Runways and Platforms
  Platform Railings
  Platform Toe Boards
Traveling Cranes
  Crane Bridge Foot Walks
  Access to Foot Walk
  Access to Crane Cab
  Crane Warning Signals
  Crane Cabs
  Crane Bumpers
  Crane Trolley Pans
  Crane Fenders
  Crane Safety Switches
Elevators
  Elevator Shear
  Elevator Safety Catches
  Elevator Shaftway Entrances
  Elevator Shaftway Protection
  Elevator Car Limit Stops
  Elevator Machine Limit Stops
  Sides of Elevator Car
  Elevator Car Lighting
  Elevator Landing Illumination
  Elevator Signal Systems
  Elevator Locking Device
  Elevator Car Top
  Protection under Elevator Sheaves
  Elevator Operators
Boilers
  Boiler Safety Valves
  Boiler Blow-Offs
  Boiler Room Exits
  Boiler Valve Locks
  Boiler Non-Return Valves
  Boiler Inspections
Electrical Equipment
Explosive Liquids
Explosive Vapors
Acids and Caustics
Engines
  Engine Fly-Wheels
  Engine Governor
  Engine Parts
Transmission of Power
  Gears, Friction Drives, Sprockets
  Friction Clutches
  Vertical and Inclined Belts
  Horizontal Belts
  Shafting
  Shaft Ends
  Shaft Projections
  Belt Shifters
Control of Power
  Individual Drives
  Group Drives
  Power Control Systems
Machines
  Machine Stopping Devices
  Moving Parts of Machines
Points of Operation
Welfare and Health
  Ventilation
  Rubbish and Material
  Light
  Eye Protectors
  Respirators
  Foot and Leg Protectors
Safety Organization
  Class A—1 to 150 Employes
  Class B—151 to 500 Employes
  Class C—501 Employes and Over
First Aid and Hospital
  First Aid Kit
  Dispensary With Nurse
  Emergency Hospital

The Safe Practices pamphlets published by the National Safety Council have been developed by a corps of engineers who are familiar with the outstanding hazards of industry, and no safety inspector can afford to be without this valuable information. The subjects covered include:

Subject	*Pamphlet No.*
Ladders	1
Stairs and Stairways	2
Boiler Rooms	3
Cranes	4
Belt Shifters and Belt Shippers	5
Knots, Bends, Hitches, and Slings	6
Belts and Belt Guards	7
Shafting, Couplings, Pulleys, Gearing	8
Engine Guarding and Engine Stops	9
Oiling Devices and Oilers	10
Floors and Flooring	11
Scaffolds (for industrial plant use)	12
Grinding Wheels	13
Goggles	14
Freight Elevators	15
Clothing	16
Yards	17
Power Presses	18
Exits, Fire Alarms, and Fire Drills	19
Woodworking Machinery and Equipment	20
Accident Records	21
Shop Lighting	22
Gas and Electric Welding	23
Fire Extinguishment	24
Acids and Caustics	25
Manila and Wire Rope	26

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The American Society of Mechanical Engineers has developed a Boiler Code that has been adopted by a number of States, and the society has in preparation a Code of Safety Standards for the Construction, Operation and Maintenance of Elevators, Dumbwaiters and Escalators, which is being prepared in co-operation with the United States Bureau of Standards,

The United States Shipping Board Emergency Fleet Corporation has prepared a very complete set of safety specifications for plant construction and equipment, covering the following subjects:

Construction Features
Workmanship, Material and Inspection
Compensation Insurance
Legal Requirements
Safety Specifications for—
  Building Construction
  Cranes
  Elevators
  Electrical Apparatus
  Floors and Floor Openings
  Illumination
  Ladders (permanent
  Platforms and Runways
  Power Plants, including—
    Boilers
    Boiler Plant Design
    Engines, Turbines and Accessories
    Motors and Generators
  Railings and Toe-boards
  Railroad Tracks and Clearances
  Safeguarding—
    Machinery
    Power Transmission Apparatus
    Remote Control Apparatus
  Stairways

The United States Bureau of Standards has developed a National Electrical Safety Code, which has been published as Circular No. 54.

These are a few of an almost endless number of publications, all of which could properly be included in the plant safety library, but this limited number is offered as furnishing the foundation from which can be developed comprehensive and practical safety recommendations.

FREQUENCY AND SYSTEM

Inspection that is not followed up until recommendations are completed surely cannot be classed as good inspection. Quite naturally, the most important things should receive first attention, and as the fixed hazards of the individual plant are determined, a follow-up system suitable to local conditions should be developed.

While we place emphasis on prevention, and inspection to prevent, accidents will occur, and every accident within a plant, in fact, every near-accident, should be investigated; a thorough inspection made, and preventive recommendations submitted.

Safety and operation go hand in hand, and where the operating department is held equally responsible for accident prevention as for production, the lowest accident frequency is found. Each department head is held responsible for the accidents occurring within his department, and all foremen are trained to act, in a measure, as safety inspectors.

When equipment is inspected to ascertain whether or not it is in operating condition and necessary repairs made, safety inspections properly become a part of these maintenance inspections. For example, in a steel mill the electrical department is held responsible for the mechanical and electrical maintenance of a hot metal crane. When the daily or weekly inspections are made of cables, gears, electrical and mechanical brakes, etc., these inspections become as much a matter of safety inspections as of operating or maintenance inspections.

Department safety committees, made up of foremen who are held responsible for local conditions, are, from a practical standpoint, unquestionably best qualified to make recommendations for the protection of themselves and their fellow workmen.

The safety inspector or safety engineer in such plant acts in a supervising capacity; makes recommendations as to forms of safety inspection, follow-up systems, etc.

As to frequency of inspection, this is a matter to be adjusted in accordance with local requirements. Some equipment must necessarily be constantly under inspection, whereas other equipment requires only periodical inspection.

It is a well-known saying that "What is worth doing is worth doing well," and I know of nothing to which this applies more than to inspection, for what warrants inspection warrants good inspection.

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Public Accidents and Their Cost

By Frederick S. Crum

Assistant Statistician, Prudential Insurance Company, Newark

Proceedings of the Eighth Annual Safety Congress

ONE of the most laudable recent attempts to separate persons killed as a direct result of their employment from persons killed otherwise is that made by the Metropolitan Life Insurance Company.

OCCUPATIONAL ACCIDENTS

In this mortality experience—limited to white males, ages 15 and over and for the period 1912-1916—out of 14,151 deaths from 16 specified causes or forms of accidents, careful inquiry revealed the fact that only 28 per cent were definitely assignable to occupation or were of occupational origin. If weather agencies, such as lightning, excessive cold, excessive heat (isolation) and certain other forms or types of accident had been included, the percentage would have been smaller. Again, it must be remembered that this experience embraced mainly the industrially employed, or wage-earners. If the professional, commercial and other largely non-wage earning classes had been as fully represented as in the general population, the effect would have been still further to reduce the percentage of accidental fatalities of occupational origin. In only four types of accidents in this experience traumatism in mines and quarries (91.4 per cent), traumatism by machines (80.9 per cent), crushing—other than vehicular and in mines and quarries, by machines and by falls (64.9 per cent), and electricity—lightning excepted (61.9 per cent)—were the percentages of fatalities of occupational origin in excess of 50. On the other hand, for drowning accidents the percentage of occupational origin was only 6.2 and for falls the percentage was only 6.3. For railroad accidents the percentage assignable to occupation was only 35.2. Obviously if females had been included in this experience these percentages would have been further and quite materially reduced.

PUBLIC ACCIDENTS AND "HOME" ACCIDENTS

If we assume that one-fourth the total accidental fatalities in the general population of ages 15 years and upward are due to occupation the estimate is probably a liberal one. Three-fourths of the deaths by accident, ages 15 and over, would then be assignable to either public or home accidents. Here, however, we are left without any very definite knowledge of what percentage or proportion belongs to either class. From general knowledge and experience, however, it seems reasonably certain that fully one-half of all the fatal accidents in the United States are chargeable to public accidents. It is quite probable that the true proportion considering all ages is nearer 60 than 50 per cent, but, to be conservative, this argument will be based upon the assumption that 50 per cent of all accident fatalities in the United States are of the public type.

In the registration area of the United States during the calendar year 1917, which then embraced about 73 per cent of the total population, there were 65,644 accidental deaths, so reported. For the whole population and area of the continental United States the total of accidental deaths must have been close to 90,000 during 1917. On the basis of the above assumption 45,000 of these may be considered as having been of the public type. Of this total (45,000) about three-fourths were males and one-fourth females.

Considering the age factor, we know that in the registration area during the 10 years 1907-1916, 12 per cent of the decedents by accident were of ages under 5 years, 9 per cent ages 5-14 years, 44 per cent ages 15-44, 20 per cent ages 45-64 and 15 per cent ages 65 and over. The age distributions of those killed by

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accident are quite different for the two sexes, however.

HIGH TIME FOR DEFINITE ACTION

It must be patent to every reasonable person that public accident prevention is a worth-while undertaking and that organized effort should be put forth on a Nation-wide scale to abate the present criminal negligence and recklessness which are so characteristic of Americans. In no other civilized country is life held so cheap. It is high time that a more definite and resolute course of action be adopted by the National Safety Council and other official and public organizations to check these enormous and largely preventable losses of lives and property due to public accidents.

A good beginning will be to place the facts before the public in a clearer light. This cannot be done efficiently until public accidents are more completely reported, more intelligently classified and more clearly differentiated from industrial and home accidents. To this end the committee on statistics of this organization, of which I have the honor to be chairman, is trying to develop a blank form for the better reporting and recording of public accidents. When this is perfected we may hope to get information before the public, the truth of which will be undeniable and the significance of which will be so truly startling that a much wider co-operation of Government and public for the prevention of public accidents must be the sure result. Then and only then can we hope to see a reduction in public accidents similar to that which is now being effected in industrial accidents and in certain diseases such as pulmonary tuberculosis, typhoid fever and diphtheria.

DISASTERS

Some of the more important public accidents involve such loss of life that they may properly be designated as disasters. Many of the land transportation or vehicular accidents fall within this class, and a large proportion of serious accidents at sea, as also many navigation accidents on rivers and other inland waters, obviously fall within this group of disaster.

Preventing Accidents in Gas Plants

By J. F. Conner

Safety Supervisor, The United Gas Improvement Company, Philadelphia

Proceedings of the Eighth Annual Safety Congress

THERE are certain zones in gas works where in the course of operation pockets of gas may accumulate and, with the admixture of air, serious explosive hazards may form. Precautions should be taken against such conditions arising. The ventilation, lighting and the lighting system of such zones are questions for consideration. Such places should be as well ventilated as conditions will permit. In the lighting system, approved types of keyless socket, vapor proof globe electric lamps with remote switch controls should be used, to guard against the possibility of the gaseous atmosphere being fired by an electric arc. Warning signs of size sufficient to attract attention cautioning against smoking and the carrying of naked flames in such zones should be posted in conspicuous places.

Like precautions should also be taken to guard against dust explosions in coal crusher rooms and pits where the air may be heavily charged, especially while the crushers are in operation, with minute particles of carbon which may be ignited and exploded by contact with an exposed flame. Dust explosions, while infrequent in gas plants, have been known to occur frequently in other industries with disastrous results.

Emergency conditions may arise which will require working against live gas. In such instances the workman should be protected by a suitable type of respirator. The same precaution should

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be taken when a workman is required to enter any gas charged atmosphere, and in every instance he should be under the clear observation of a person outside the danger zone, who should be prepared to render immediate assistance. Oil and other tanks in which gases are present should, where conditions will permit, be first purged by steam and well ventilated before entrance is made to such enclosure. Life lines can in such work be used to advantage.

Generally speaking, gas plants are usually well guarded mechanically. Occasionally, however, accidents occur on machinery due to guards being temporarily removed during repairs and failure to replace guards before putting the machines in operation again, or possibly to an exposure being considered too remote to warrant guarding.

SIMPLE HAZARDS

A review of cases reported shows that the causes responsible for the greater number of accidents are due to the simple hazards found in all industrial establishments such as tripping, falling, slipping and lifting, protruding nails, to the use of defective hand tools, ladders, scaffolds and makeshift supports that give insecure footing, and other like minor hazards, and to disregard of instructions to wear goggles when engaged in work in which the eyes are exposed to flying particles or splashing liquids.

The safeguarding of machinery and the installation of other mechanical devices for the prevention of accidents is unquestionably a necessary measure in any well-ordered plant, but in many cases the guards cannot be made absolutely fool-proof, so that in the final analysis the greater reliance for preventing accidents must be placed on the human agency. If we are to continue to look forward to a reduction in the accident frequency, greater efforts must be made to educate the workman to know the dangers that beset him and others from carelessness, thoughtlessness and inattention on his part, and to arouse and maintain the accident prevention spirit in him.

EDUCATION OF EMPLOYES

How we shall best reach the workmen by educational propaganda is a question of personal opinion. Reasoning with the men collectively is usually attended by good results. In obdurate cases, however, resort to individual approach brings the best results. We should not, however, be too hasty in censure of the workman for apparent indifference to safety. He possibly may be influenced by environment and be reflecting the attitude of his superiors to this important question. The problem, to my reasoning, should first be brought convincingly to the attention of the man higher up, the man directly in charge of the operation. If he meets it, as he should, in a spirit of serious interest and by precept and example sets the standard for his subordinates, lets it be known that he is keenly alive to any failure or disinterestedness on their part to shoulder their duty, the indifference, if any, of the foremen and sub-foremen will quickly vanish and those in positions of responsibility will, figuratively speaking, be standing on their toes and showing greater activity toward preventing accidents.

The interest they show is bound to be reflected in the workmen and with the environment of good housekeeping, a place for everything and everything in its place, which must of necessity be part of the program, there will come a subconscious awakening of the prevention spirit in the workmen, and that is the dominating factor in preventing accidents.

The company with which I am connected is one of the pioneers in the first aid and prevention field. Its activity in this regard dates back some 15 years. The education of its employes in accident prevention has been carried on by means of safety rallies, including motion pictures, shop meetings including lantern slides, a house organ under the title of *Safety News*, the use of bulletins, buttons and other measures that tend to instill, attract and maintain an interest in accident prevention and in holding down the accident occurrences.

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Why Does Every Electric Railway Have a Safety Organization?

By C. B. Proctor

Claim Agent, Memphis Street Railway Company, Memphis

Proceedings of the Eighth Annual Safety Congress

THE ideal safety organization is composed of a select body of men representing every department of the railway; men of intelligence; men whose ambition it is to render to the patrons of their railway safe and courteous service; men who do their utmost by example and influence to develop in themselves and associates a high state of efficiency; men who practice the Golden Rule, and endeavor to persuade their fellow workmen to do likewise; men who teach safety by precept and example, first, last and all the time; men who are loyal to their country, their fellow employes and their company; men who so act because it is right and are actuated by the desire to bring happiness. instead of sorrow, to prevent, instead of cause, pain and suffering, at the same time realizing that such conduct redounds to the pecuniary benefit of themselves and their company.

The safety organization is most emphatically not a collection of spies. It tries to down no one, but to elevate all. It wants to get no man's. job, but aims to help him keep it and improve both the man and the job. It purposes to interfere with no one's rightful prerogatives, but hopes to better the service by pertinent suggestion. It intends in no way to interfere with the administration of discipline; nor is it to be used as a disciplinary measure. It tries to accomplish nothing through compulsion, but endeavors to get results from education and appeal to the higher principles that are implanted in all. In it there is no room for personal malice, no place for the backbiter or the disorganizer. Its purpose is not to disorganize or breed strife, but to unite and promote harmony. The successful safety organization must have the hearty support of both the management and the organized employes.

The foregoing briefy outlines the ground plan of a 100 per cent efficient safety organization. It is admitted that we rarely reach the 100 per cent mark, but it has been proven beyond cavil that with the assistance of a live safety organization, accidents with their attendant loss in human life, in pain and suffering and in cold dollars and cents, can be reduced fully 50 per cent.

When we consider what the electric railways are facing today it seems incredible that the management or organized employes of any electric railway should fail to avail themselves of such a valuable adjunct. Such failure can only come from a complete misconception of the uses and purposes of the safety organization on the part of either management, the employes, or both. It is, I believe, fear of its misuse that prevents the universal adoption of the safety organization.

If a personal reference may be pardoned, I had the pleasure of serving as chairman of a safety organization from January, 1913, to December, 1918, at which time circumstances beyond our control made it necessary to suspend, for a time, its operation. We are now working out the details of a reorganization and expect to have them completed in the near future.

From experience we have learned what can be accomplished with the aid of the safety organization. It is not a panacea. As before stated, it in no way interferes with the administration of discipline, nor does it operate to any man's hurt, but it does provide a medium for the getting together of officials and employes on a friendly basis. It does promote harmony and co-operation, and it certainly aids materially in reducing to the minimum risks of operation and cost of maintenance.

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High Tension Lines

By H. J. Burton

Consumers' Power Company, Jackson, Mich.

Proceedings of the Eighth Annual Safety Congress

A COMPETENT crew of trained men is essential if work on live lines is to be performed safely. Too much care cannot be taken in the selection and training of the foreman who has to take immediate charge of the work and all of the men must be instructed as to the character of all lines and equipment on or near which they are to work. Employes should not be left to learn their work by the "absorption" method, they should learn by the "intentional" method, that is, it should be the duty of some competent person to instruct them.

PROTECTION FOR THE MEN

Rubber gloves, when not in service, should be stored in a dry and cool place where the temperature does not exceed 75 degrees F. The gloves should not be exposed to the light, and each pair should be kept in a separate box. If rubber gloves have to be stored for any length of time, it is a good practice to take them out periodically and roll or crumple them with the hands. They should then be straightened out and laid away again. This practice seems to revive the rubber and lengthens the useful life of the gloves. It should be borne in mind that a perfect pair of rubber gloves can be rendered useless for work on live conductors if subjected to rough usage.

LINEMEN'S SHIELDS

Linemen's shields or protectors should always be used when work is to be done in tight places on distribution circuits. These shields, which are of rubber or some other insulating composition, are for placing over live conductors that are in close proximity to the lines on which the work is to be done. These protectors are guaranteed by the manufacturers to withstand all ordinary distribution circuit voltages.

Linemen's spurs are necessary for climbing wooden poles, and they should always be kept in first class condition. The gaffs should be kept sharp and should be replaced when they are so short that they will not puncture into the wood far enough to hold safely. The straps and buckles should be inspected frequently for defects.

BELTS, BOOTS, ROPES

Safety belts are essential for preventing accidents to linemen, and yet quite frequently they are not used. The materials used in the manufacture of these belts should be the best obtainable and the workmanship should be of the best. They should be inspected frequently to make sure the straps, rings, snaps, rivets and buckles are in good condition. When using a belt, care should be taken to see that the straps and buckles are properly secured before weight is brought to bear on them.

Rubber boots and coats are now used quite extensively by linemen, their use being especially valuable when work is to be done during or immediately after a storm where broken lines or falling wires have to be handled.

The ropes used in connection with the work on high tension transmission lines should be impregnated with paraffin and kept in a canvas bag. The insulating rods should be thoroughly treated with paraffin. A drying room or oven should be provided where the tools can be thoroughly dried and then treated. This should be done at regular intervals.

Insulating tools and appliances should be of the best obtainable, and employes should be instructed that they must not use anything else as a substitute. The insulation commonly placed around the handles of pliers, screw drivers and other tools used by linemen serves to keep static away but should not be relied upon for complete protection. Rubber gloves, in fact, all insulators, may lose their insulating qualities and become

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incapable of resisting high voltages by wear or by deterioration. If they are not inspected and tested periodically, their use may prove a hazard instead of a protection.

INSTRUCTING EMPLOYES

(1) Employes should be instructed how to avoid shocks and short circuits when working on or near live conductors. Before starting any work they should be informed by the foreman which conductors they are to handle and which to avoid.

(2) Linemen, before climbing, should be satisfied that the pole or tower is in good condition and strong enough to bear additional weight. Poles may be tested near the ground line for decay with a bar or screwdriver, and sounded for decay at the center of the pole by rapping with a heavy tool or block of wood.

(3) Sometimes because of leaking insulators, defective transformers or broken ground wires caused by storms, or other unusual conditions, poles or towers may be energized or "hot" and difficult or even dangerous to climb. If it is necessary to do work upon a line or circuit and conditions are such that pole cannot be mounted or climbed without danger, the circuit should be made "dead" at least until protection shields, barriers, or other safeguards are in place.

(4) Underground electrical workers are exposed to special dangers. There is always the possibility of gas in tunnels, conduits and manholes, and employes should be cautioned not to smoke and to keep all open or exposed flames away from manholes.

(5) Numerous accidents have occurred to linemen when working on new extensions to distribution feeders, due to the fact that the extension has been connected or tapped on to the energized circuit before the new work was completed. New work should be finished and all of the crew engaged on the work notified before the "hot tap" is made.

What has been said in the foregoing applies more particularly to distribution circuits.

SPECIAL PRECAUTIONS TO BE OBSERVED IN CASE OF LINE TROUBLE

Noise and static on telephone lines, discharging lightning arresters or an unusual amount of static on or around lines and insulators indicate trouble, and it may be due to defective insulators or to an "arcing" ground, on the high tension lines. Foremen should instruct their men to work with extreme caution at such times. It is generally advisable to stop the regular work of changing insulators until the cause of the trouble has been located. This precaution should always be heeded on systems with a grounded neutral.

Before any work on high tension transmission lines is undertaken, for the first time, a careful analysis should be made of the job. Each operation should be considered and men should be selected and trained for the different operations they have to perform.

VALUE OF INSULATING RODS

It is interesting to note that linemen who have tried both methods of changing insulators would rather work on live lines with insulating rods between them and the line, than on "dead" lines without this protection. The dangers incident to the accidental energizing of lines that are supposed to be "dead" are eliminated. Emergency or rush work which always adds to the hazards is to an extent avoided and the work can generally be done in the daytime when the light is good.

Telephone, telegraph, signal and other lines that parallel high tension lines are always liable to be more or less energized and dangerous to handle. This fact should not be overlooked in instruction given to linemen.

PRIME REQUISITES

The prime requisites for safe working on high tension lines are: Safe construction, a good foreman, competent workmen equipped with proper tools and insulating appliances.

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Selecting Safety Committees and Maintaining Interest

By Robert Scott

Superintendent of Insurance and Safety, Atlantic Coast Line Railroad

Proceedings of the Eighth Annual Safety Congress

THE most convincing argument that comes to my mind just now in connection with awakening interest among rank and file men in the cause of safety is the one that has been used a great deal of late. Ask any man in train, shop or roadway service, "Who suffers most as a result of personal injuries brought about by unsafe conditions or dangerous practices?" There is but one answer, and when this is brought home to them they invariably begin to think, and this is the first step in the right direction.

Another important thing is to impress upon all employes the fact that the safety organization embraces every man connected with the road, and that all of them are expected to do their part in carrying on the work of accident elimination.

Next comes the task of educating the men as to how all this can be done without undue interruption of their work. It can be accomplished by personal appeals to the men by head of the safety department or some well equipped representative. It can also be done by the distribution of literature on the subject, but this method is not so effective as the former one.

HOLDING EMPLOYES' INTEREST

Now, after having aroused the interest of employes, a more difficult problem arises as to how this interest can be held. I am convinced this cannot be done by following any one scheme, but can only be successfully accomplished by the employment of a combination of methods such as the following:

Well prepared bulletins posted on safety bulletin boards.

Safety rallies, with a good program, effectively advertised and supported by hearty co-operation of officials.

Introduction of special papers on live topics at regular meetings by employe members.

Acknowledging receipt of all suggestions by letter, and advising those making them of disposition in each case.

By having safety discussed at brotherhood meetings of labor organizations.

By judicious distribution of safety propaganda through the means of employes' magazines or circular letters.

Through the employment of a motion picture car, accompanied by a capable lecturer.

By personal work among the men: this to be done only by those peculiarly fitted for converting influential unbelievers in the doctrine of safety.

By the rotation of committees, thus bringing new life into the organization.

By issuing membership cards and safety emblems to all members of safety committees.

By awarding medals or trophies to either individuals or committees, divisions or shops, for special accomplishments in connection with the safety movement.

MOTION PICTURES

Among the things that have been used with the greatest success is the motion picture car, accompanied by a lecturer, on account of the benefit that accrues from placing the importance of safety before employes and their families, also in enlisting their interest and support in accident prevention. It is almost universally agreed that education in safety work is more vital than anything else, and that the majority of accidents on railroads can only be prevented when employes have had instilled into their minds the important principles of safety. When the human element can be made as nearly 100 per cent safe as our mechanical devices and as our physical conditions have, accidents will be reduced to a minimum. There is no better way of making an indelible impression upon a person's mind than by exhibiting a picture of conditions. In many ways in everyday life motion pictures have proven to be of great educational value. So it is in accident prevention work, and even more so, for when a railroad man sees a picture of an accident it seems to write the conditions and circumstances more deeply in his memory than anything else could do it.

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Hand Car and Motor Car Accidents

By J. L. Walsh

Superintendent of Safety, Missouri, Kansas & Texas Railroad, Dallas

Proceedings of the Eighth Annual Safety Congress

FOR general use the motor car should be as simple as possible, fool-proof, easy to operate and maintain. These cars, I think, should be of the direct connected type, 2-cylinder engine with its few parts to get out of order and adjustment. If possible to attach a speed governor restricting the speed to a maximum of 15 miles per hour to these cars, one that cannot be easily disconnected or tampered with, one that is simple and will not cause engine trouble, would suggest that all cars for general use be so equipped. There should be a curved hand rail or guard extending to the floor on front of car, and also a toe board, to prevent tools and material from bouncing off and derailing it. The wheels should not be more than 16 inches in height, and the floor of the car should be extended flush with the outer edge of the wheels to prevent men getting their feet under the wheels in attempting to board the car from the side. Last but not least, each car should be fitted with a positive acting, effective hand brake.

The surest method of keeping hand and motor car accidents to a minimum after adopting a practical, properly-equipped car as standard, best suited for the purpose intended, is, I think, to promulgate a practical set of rules covering their inspection, maintenance and operation, and see that they are strictly complied with.

POINTS THAT SHOULD BE COVERED

I will not attempt to outline a complete set of rules or instructions in this matter, as they would necessarily vary under different conditions, but the following are some of the points that should be covered:

Some member of the gang using the motor car, other than the foreman, should be assigned and trained to operate the car, thus leaving the foreman free in going over the line to make necessary inspection of the track, bridges, right of way fences, etc., and also allow him to act in the capacity of conductor. The foreman, of course, should be equipped with the current time table and standard watch.

Each member of the gang should be assigned a certain regular place on the car, overcrowding avoided, and expected to keep a sharp lookout for trains in each direction. Certain members of the gang should be charged with the duty of flagging in either direction if necessary, and equipped with the necessary flagging equipment.

The men charged with the responsibility of putting the car on the track and taking it off should be assigned to a regular position with reference to the car, instructed and frequently drilled in the most practical and safest manner of handling the car, somewhat similar and for the same reason that boat drills were held on our trans-Atlantic steamers during the submarine warfare. This will result in less confusion, and increase the co-operation in cases of emergency.

Certain members of the gang should be assigned the duty of starting the car from the rear, the other members of the gang taking their seats on the car before it is started.

Instructions should be issued and the men trained in the safe manner of loading tools and material on the car in such a way as to avoid chance of it falling off and causing derailment.

Motor cars should not be operated at night except in cases of emergency, and then only when protected by a red light that can be seen from both directions.

Employes should be prohibited from standing on the car or attempting to mount or dismount from same while in motion.

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If truck or push car is attached to the motor car, it should be coupled close, and the men pushing the car to start, must push from the rear of truck or push car. The truck or push car should never be placed ahead of the motor car.

Motor car should not be set off on public highway, as serious injuries have occurred to drivers because of teams being frightened.

When necessary to apply brakes in emergency cases, warning should be given to all occupants of the car to prevent chances of their being thrown off by a sudden slacking of the speed of the car.

Motor cars should not follow a moving train closer than 1,000 feet, nor follow another motor or hand car closer than 500 feet.

The use of motor car should be confined strictly to company business and should not be taken off the section on which it is assigned, except on instruction from superior officers, or in case of storm or emergency making it necessary to file report at nearest telegraph office and secure instructions.

Motor and hand cars should be thoroughly inspected by operator daily before starting to work, and necessary repairs and adjustments made.

MOTOR CAR HAS COME TO STAY

The gasoline motor car has come to stay, and I believe all the railroads using them have issued rules and regulations governing their operation, but there is a general neglect in enforcing them, and little attention is paid to maintenance forces until a serious accident occurs, when for a short time the matter has more or less attention, followed by a gradual relaxation, until another accident occurs. We must bring about a realization that an injury or death among our maintenance forces is just as serious as in any other department of railroad service, and make a consistent effort to prevent them through safety education.

"Forgot Himself to Death"

A FIRE burned down several poles on a 60 KV line of the Pacific Gas & Electric Company. One wire fell across a highway and over a barbed wire fence, charging it with high tension current. A lineman's helper was stationed on the highway, to warn passersby while another man went to open a switch and a third went to fight the fire.

After a few minutes in the highway, the lineman's helper walked over to the fence to look at the fire, or to aid in fighting it; and, forgetting that the fence was charged, touched it and was killed.

"It is dangerous to take orders with half an ear, or to fail to understand, or to forget. In this case it cost a man his life."

Preservation of Teeth and Health

UNTIL recently no one thought of going to a dentist until he had a tooth to be pulled or filled. He waited to be prompted by pain.

The dentist's most valuable services are rendered in the direction of the preservation of teeth. If the teeth are thoroughly cleaned by a dentist every 3 months, beginning in early youth, it will be a rare thing to lose a tooth or even to have a cavity to be filled. Brushing the teeth and gums every day in the proper manner is the best that one can do for himself, but mechanical cleaning at the dentist's office is a certain preventive of pyorrhea. Teeth should be kept so clean that there is not a speck on them. A half hour at the dentist's every 3 months will insure sound teeth and better health throughout life.

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The Industrial Safety Conference in December

A CONDENSED report of the Industrial Safety Conference held at the Bureau of Standards, Washington, D. C., December 8, 1919:

In the absence from Washington of the director of the bureau, Dr. S. W. Stratton, the meeting was called to order by Dr. E. B. Rosa, who summarized at length the events leading up to this conference and referred especially to the proceedings of the similar conference held on January 15, of which this in a sense was an adjourned meeting. The discussion at that conference was summarized and reference made to its action for the appointment of a committee which has since made a printed report.

The principal subjects which came up at the January conference were the reorganization of the American Engineering Standards Committee, and the question of whether the safety work of the Bureau of Standards should be conducted under the scheme of procedure laid down by that committee.

The last question was the subject of a letter ballot on Plans "A" and "B" sent out in the spring, the result of which was a decided majority in favor of procedure under the plan of the American Engineering Standards Committee. This committee has adopted since the January conference a revised constitution which opens its membership to other organizations in addition to the original five founder societies and three Government departments.

SAFETY CODES

Dr. Rosa also announced the appointment of a general advisory committee on industrial safety codes for the purpose of assisting the Bureau of Standards in deciding upon policies and procedure in its work on safety codes. He said: "The advisory committee recently appointed by the bureau is not the managing committee proposed under plan A. It is for the present merely an advisory committee for the Bureau of Standards. After this conference is ended that committee will meet and deliberate. If this conference wishes to make any recommendation on request to that committee it can do so, or if it wishes to adopt it as a committee of this conference it can do so. Or this conference can have a different committee if he prefers, or can appoint some additional members to sit with or become a part of the bureau's committee. We want this conference to feel entirely free to discuss the important question submitted without hindrance or restriction of any kind."

ENGINEERING STANDARDS

Prof. Comfort A. Adams, chairman of the American Engineering Standards Committee, then spoke on the work of that committee and its recent reorganization. Membership in the committee is now open to such organizations or groups of organizations of National scope as may be approved: there shall be no more than three members from each such organization, and the annual dues are $500 for each representative. Applications for membership must set forth the scope of their standardization interests and activities and the number of members. If such application is approved by three-fourths of the committee it is submitted to the organizations having membership on the committee, and unless disapproved by more than one-fourth of these within 90 days, it is considered to be ratified. The speaker stated that he would be superseded as chairman of the committee by A. A. Stevenson, and that the permanent secretary of the committee will be Dr. P. G. Agnew, at present in the Bureau of Standards. The headquarters of the committee will be in New York City.

The procedure to be followed in the development and adoption of American Engineering Standards was then outlined. Committees to formulate standards shall be organized by suitable engineering societies, Government bureaus or

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other bodies which shall be designated as sponsors and shall be responsible for the carrying out of the work. Such a committee must include representatives of all interests concerned in the formulation of a standard, and, upon completion of its work and substantial agreement upon the same, shall report to the sponsor body. If the latter adopts the standard it is forwarded to the American Engineering Standards Committee for approval, and, when so approved, shall be designated as either Recommended Practice, Tentative Standard or American Standard. The standards committee will not itself pass judgment upon the details of the proposed standards, but rather upon the composition of the committee which has formulated the standard or approved it. This committee must not be confined to the membership of the sponsor body, but must include representatives of all interests concerned in the standard.

A number of other organizations have already applied to the American Engineering Standards Committee for membership. These include the National Safety Council, American Mining Congress, insurance, utility and technical associations. To become a member an organization must be National in its scope. Thus, individual State industrial commissions would not be considered eligible, but as a group they might join through their National association.

STATUS OF INDUSTRIAL SAFETY CODES

The status of industrial safety codes now existing was next discussed by Dr. M. G. Lloyd of the Bureau of Standards, Dr. L. W. Chaney of the Bureau of Labor Statistics, S. D. Collett of the American Society of Mechanical Engineers and W. S. Paine of the Aetna Life Insurance Company.

Dr. Lloyd exhibited a number of charts on which it was attempted to show the scope of existing safety rules in the industrial field, but exclusive of the subjects of transportation, mining and industrial hygiene. The relation of fire prevention to human safety was considered and a distinction drawn between rules for fire prevention of property and accident prevention to individuals. The regulations considered included those of State laws, commission orders, city ordinances and the rules prepared by insurance organizations, technical societies and manufacturers' organizations as well as Federal Government bureaus, the National Safety Council, etc. A knowledge of such existing rules was considered essential to the intelligent development and revision of safety regulations.

Dr. Chaney pointed out that a survey of accident records would show what hazards are greatest, and consequently what industries are most in need of safety regulations. The method of administration of safety rules is of more importance than the contents of the rules themselves, and good results depend upon general co-operation and efficient administration. Compensation laws have brought about an improvement in accident prevention work.

Mr. Collett referred particularly to the boiler code of the American Society of Mechanical Engineers and the recent work of that society in preparing an elevator code in co-operation with the Bureau of Standards.

Mr. Paine referred to the disadvantages of non-uniformity and of temporary rules, and said that to have a satisfactory code it was necessary to have the co-operation of all interested. The insurance companies had done a great deal to promote universal standards, especially through the medium of their rating bureaus, and were in a position to introduce rules and apply them before they were made mandatory by law.

METHODS AND POLICIES

The symposium on Methods and Policies to be Pursued in the Development and Introduction into use of Safety Standards was participated in by S. J. Williams of the National Safety Council, C. B. Connelley of the Department of Labor and Industry of Pennsylvania, C. M. Talbert, director of the Department of Streets and Sewers, St. Louis; W. C. L. Eglin of the National Electric Light Association, A. C. Morrison of the International Acetylene Association, A. Rousseau of the Abrasive Wheel Manufacturers' Association, Henry Sterling of the American Federation of Labor, and

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Lew R. Palmer of the Equitable Life Assurance Society.

RESOLUTION ADOPTED

Chester C. Rausch of the Safety Institute of America introduced the following resolution, which was adopted by the conference:

RESOLVED: (1) That the American Engineering Standards Committee be asked to request the International Association of Industrial Accident Boards and Commissions, the Bureau of Standards and the National Safety Council to organize a joint committee on safety codes, this committee to include representatives of these bodies and such others as they may consider advisable; (2) that this joint committee report upon the safety codes required, priority of consideration of the codes, and sponsor bodies for their preparation; (3) that this report be put in writing and placed not later than February 1, 1920, in the hands of the American Engineering Standards Committee.

Before taking the vote on this, however, another motion was passed confirming the result of the letter ballot taken last spring and expressing the decision of the conference that safety codes should be established under the procedure of the American Engineering Standards Committee.

In the discussion on this subject it was pointed out that the American Engineering Standards Committee was not primarily interested in safety matters, and that the committee contemplated in the resolution of Mr. Rausch would be directly concerned in such matters and might well serve as a steering committee on safety code work. The opinion was freely expressed that such a committee should be a permanent one, that it should contain representatives of all interests involved in safety codes, and that it might well be called a National Safety Code Conference and hold annual meetings. Such a committee would be in position to co-ordinate work on safety codes, to arrange for necessary interpretations, to initiate new codes as they become necessary, and to form a central agency to insure co-operation.

WORK OF COMMITTEE

At a meeting of the general advisory committee of the bureau on the following day the work of the proposed committee which the American Engineering Standards Committee has been asked to appoint was further discussed, and the opinion was generally expressed that such a committee, if made a permanent organization, would render the general advisory committee of the Bureau of Standards unnecessary. There was also a discussion of means for introducing codes and for securing interpretations of rules in particular cases as the necessity for the same might arise.

Before adjournment a motion was passed giving the Bureau of Standards a vote of thanks for taking the lead in calling these conferences and bringing the matter of engineering and safety standards to the attention of all concerned.

Proper Safeguards Missing

A CASE due directly to lack of proper mechanical safeguarding is cited by a compensation insurance department: A press had been installed after the plant had been inspected and some overhead gears had been left unguarded. It was necessary for the employe operating the machine to reach his hand to a point near these gears, and in doing so the inevitable happened. His hand was drawn into the gears, resulting in a total loss of the member. The following comment is made: "Probably the best method of preventing this sort of thing happening on newly installed machines is through inducing the insured to maintain a safety organization and enforcing a rule that the safety engineer or committee is to approve any machine newly installed or newly repaired before the machine is actually placed in operation."

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Effective Means of Using Rescue Apparatus

By J. T. Ryan

Vice President, Mine Safety Appliances Company, Pittsburgh

Proceedings of the Eighth Annual Safety Congress

NO work can be done successfully unless properly organized. This certainly applies to the use of mine rescue apparatus in connection with fighting mine fires. An organization in this case is twofold: First, the proper organization of the rescue crew, and, second, the organization of the work. Unless your rescue work is organized to the extent that the apparatus is rigidly inspected and tested at least once a month, and preferably once a week, and men properly trained and certified by some competent authority, and training periods continued at regular intervals, then you do not maintain a real rescue equipment. You are only laboring under a false sense of security, and certainly if you see the need of such an equipment to the extent that you have gone to the expense of installing same, you should see that the work is properly carried out so far as keeping the equipment in condition and your men properly instructed and trained. This requires only a small additional expense and assures you of a full degree of efficiency when an emergency arises which calls for the immediate use of your equipment. When the emergency arises, it is then too late to order material, to put your apparatus in proper working condition, or to train your men, and it is very unwise as well as dangerous to send a rescue crew not properly trained into a mine to fight a mine fire, or with apparatus not in good condition or properly inspected.

OFFICIALS SHOULD KNOW THE APPARATUS AS WELL AS MINERS

The second phase of organization in connection with the use of rescue apparatus in fighting mine fires is the general organization of the work of which the rescue squad is an integral part. Some recognized authority must be in charge of the entire operations. The one invested with this authority should be a man of courage, possessing good judgment, a cool head, having had previous experience in fighting mine fires, and training in breathing apparatus. Regardless of how much experience a man may have had in fighting mine fires, if he has not taken the trouble to acquaint himself with breathing apparatus so as to realize its advantages and limitations in connection with fighting mine fires, he lacks progressiveness and is not competent to conduct this work efficiently, providing rescue apparatus is to be used in the operations. Fortunately, most up-to-date mining men have this knowledge today and are competent to direct this work. When the rescue squad knows that the man who is directing the work is familiar with their phase of the work and will not ask them to go where he himself would not go if he were wearing the apparatus, then the work will be carried out with dispatch.

THE VALUE OF A WELL ORGANIZED CREW

The rescue squad should be composed of men familiar with the mine. Therefore, every mine should have at least ten of its men trained in the use of self-contained breathing apparatus. If the mine where the fire occurs is equipped with breathing apparatus and a properly organized rescue crew in charge of a competent man familiar with the mine, they can get on the job in a very short time, depending upon their own emergency organization, and in most cases can control the fire before it reaches serious proportions.

PROPER PROCEDURE AT A MINE NOT EQUIPPED WITH RESCUE APPARATUS

If the mine is not equipped with breathing apparatus and the fire gets be-

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yond the control of the local officials, a rescue crew is called from the outside. The first thing they should do upon arriving at the mine is test out their apparatus and see that same is properly charged and in good working order. The captain should supervise this work.

While the crew is engaged in this work, the man in charge of same should confer with the officials in charge of the mine and familiarize himself with the working by consulting the mine map or model and ascertain the probable location of the fire and what has been accomplished previous to his arrival.

If men are in the mine and it is not definitely known that they are dead, the first thing to do is to endeavor to reach the men. This may necessitate controlling the fire temporarily or changing the ventilation to permit the apparatus crews to penetrate the workings to the points where the men are most likely to be.

This work usually requires the use of apparatus and should be done without delay.

If men are known to be in the mine, never assume that they are dead.

If it is definitely known that no live men are in the mine, the problem resolves itself into controlling the fire and protecting the men who are doing this work. This is where rescue apparatus can be used to the best advantage.

PROCEDURE OF THE RESCUE CREW

Before sending a rescue crew underground clear instructions should be given the captain as to where and approximately how far they should go and what they should attempt to do. Unless the captain is thoroughly familiar with the mine the route should be marked on a blue print, which the captain should take with him. Even though the crew is familiar with the mine, a blue print should be taken along.

As soon as possible a fresh air base should be established as near to the irrespirable zone or zones as safety permits, and preferably near a telephone Temporary telephone communications should be established with the outside as soon as possible. Whenever a rescue crew works beyond this base there should be stationed there a fully equipped reserve crew ready for immediate service, one or two light or short period apparatus or carbon monoxide gas masks, stretchers, canaries, blankets and first aid material. As soon as possible the necessary tools and material for erecting temporary brattices should be advanced to this point.

If the first crew is able to complete its exploration to the limit of safety without reaching the fire zone, they should return and report conditions and then steps should be taken to move the fresh air base nearer to the fire area. This work usually requires some use of the apparatus crews. The above procedure is then continued until the fire area can be reached by the apparatus crews. However, in coal mine fires, this procedure must be conducted with great caution, particularly in gaseous mines. The return air should be tested at frequent intervals by a Burrell Gas Indicator (a safety lamp is not sensitive enough) and when the methane CH_4 content increases to a certain point previously decided upon as the allowable limit, further advance should be discontinued in that direction and seals constructed or some other plan of attack outlined. If the rescue crews are able to establish a fresh air base near the fire area, they can then proceed to extinguish the fire by the best method conditions will permit or seal it off in the smallest possible area consistent with safety.

EQUIPMENT OF MINE RESCUE CREWS

A rescue crew should consist of five properly trained men in good physical condition, equipped with rescue apparatus capable of providing the wearer with breathable air for a minimum of 2 hours of maximum exertion. Each man should be equipped with an approved electric cap lamp or flashlight, preferably the former, as it is carried on the head.

The captain, who should be in the lead, should carry a canary or carbon monoxide detector, or both, and a pick-handle for testing roof or feeling the way in smoke.

The second man should carry a flame safety lamp to detect explosive gas or

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oxygen deficiency. In metal mines where there is no danger of explosive gases, a candle is usually used to detect oxygen deficiency.

The third and fourth man should carry a stretcher and half-hour apparatus or carbon monoxide mask.

The fifth and rear man should have a supply of white chalk and should, where the atmosphere is clear, indicate the route by means of arrow marks pointing outward.

If the crew is going to enter a smoke atmosphere, a life line should by all means be carried in and each member should take hold of same, spaced at even intervals of 6 feet wherever practicable. A competent man should be in charge of the reel at the fresh air base. The life line serves as a means of preventing the members of the crew from becoming separated, as a marker for the return journey, and provides a means of signalling to the fresh air base.

The geophone, a listening device developed during the war for detecting and locating underground mining, has great possibilities in connection with locating fires or entombed men, and should now be a part of a rescue crew equipment, as the device is light and compact. This device, along with the carbon monoxide detector and carbon monoxide gas mask, are war developments which have possibilities in connection with the fighting of underground fires.

A Method of Safety Education

By R. A. Shaw

Department of Safety and Factory Hygiene, Ford Motor Company, Detroit

Proceedings of the Eighth Annual Safety Congress

OUR system of safety education has proven successful because the number of accidents have not only been checked, but have decreased. This is strikingly shown by a comparison of the months of October, 1916, and May, 1919, when there were 194 and 40 accidents respectively; a reduction of nearly 80 per cent in 3 years, while the number of employes increased 18 per cent.

Our fiscal year ending August 1, 1919, shows only 1 death among 50,000 employes, and no deaths for 11 consecutive months.

GUARDING

The first thing we do is, keep all machines, conveyors and other necessary equipment in a safe condition with efficient safety guards or devices. This convinces the employe that the Ford Motor Company is willing to do its share and creates a desire on his part to do likewise.

EDUCATIONAL REQUIREMENTS

Safety education should be something possessing power to cause inspirations and develop the individual along the lines of safety. It must be the thing to encourage men to respect the safety laws, and love humanity to such an extent as to endeavor persistently to prevent suffering by reducing accidents.

A certain amount of humor is necessary in this work. It develops cheerfulness, which produces a fertile mind for the reception of seed (new methods) and causes it more readily to take root and become (as it were) a tree with many branches spreading in all directions, comforting those in need.

MOVING PICTURES

The safety moving picture is a vital and important phase of our work. It shows the less intelligent workman the safe and unsafe ways of doing things. The pictures are acted by their fellow employes and consequently produce personal interest and enthusiasm. There was a 27 per cent reduction in accidents during the period these pictures were shown.

In conjunction with them we had dif-

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ferent foremen talk before the men, to bring out more specifically the hazards encountered by the men in their respective departments.

SAFETY RULES

Safe working rules are not all put in one large volume as is the general custom. Rules for punch presses, saws, milling machines, cranes, elevators, etc., are printed separately in a booklet cut pocket size with detachable section on the bottom, which is signed by the operator and kept by his foreman.

We feel that in this way they are read and the results gratifying.

BULLETINS

Bulletins are changed each week on our 100 bulletin boards. This serves to acquaint the employes with the different hazards. When placing them on the boards, we watch to see whether the foreman is anxious to look at the new bulletin; if so, one-half of our desired accomplishment is attained, because the men will soon follow.

INSPECTORS

Our minute-men, or, as some term them, safety inspectors, patrol the buildings and are ever ready to co-operate with the men or their foremen in any safety requirements.

INTERCHANGING OF IDEAS

Safety suggestion boxes are placed at each entrance. No prizes are given because we believe that all of our men are interested in safety to such an extent that they will gladly give their ideas to prevent suffering to themselves and fellow employes. We also have the use of the *Ford Man* to advance the interchanging of safety ideas.

MONTHLY SAFETY STANDING

A monthly safety standing is compiled and distributed to the different departments, to stimulate a race between them. A letter from the managers and president, to departments free from accidents, also creates a desire to be free from accidents.

LINING UP AT STREET CARS

A crusade to line up the men at the street cars has been successful. It matters not how many thousands of workmen are waiting for the cars, you will find them lined up one behind the other.

REASONABLE AND PRACTICAL IDEAS

I feel that if you are to be successful in educating the workmen in "Safety First," you first must have ideas that will seem reasonable and practical to them, and make them see that safety is to their advantage.

Universally, you will find that men are reasonable and will co-operate in any movement that is beneficial to them, if they only understand it to be such.

This is why safety education is absolutely necessary. You will succeed in the same degree as you are successful in presenting your ideas to the men in a way readily understood by them.

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Malingering

By Dr. Judson C. Fisher

Chief Medical Examiner, Globe Indemnity Company, New York City

Proceedings of the Eighth Annual Safety Congress

A SYSTEM to lessen malingering could be used as follows: As soon as an employe reports ill or injured he has prompt attention by a doctor. The doctor's report, estimate of disability and history of the case seen the previous day, is filed every morning. The employment card is attached to his history and physical examination card and becomes part of it. These cards or files go to a doctor for comparison. If the case looks legitimate the treatment continues until

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disability from that illness or injury ceases. The file then is placed back in the filing system and the case closed. If the case looks questionable the facts are investigated by the social service department and action taken accordingly.

If the claimant later tries to reopen his case claiming all sorts of symptoms, he can be confronted with his previous well-kept record.

If disability lasts over 4 weeks the case automatically goes out of the assistant's hands until the chief surgeon shall have made an examination and report. The chief's word is final—the man goes to work or receives further treatment—general, operative, or reconstructive. This gives also the advantage of the chief surgeon being able to watch the work of his assistants. At any time an employe is thought to be malingering the report should be made confidentially to the chief surgeon.

The scheme may be expanded into the realms of State medicine. It may also grow into a clearing house for information concerning dishonest employes, such as the life and accident and health companies support. When an employe is dishonest to the point of malingering he should be known, that the honest employes be not made to suffer by his actions. This would reduce the number of so-called "traumatic hernias" alone, so that the saving in this one type would pay for the bureau.

This scheme is also applicable to any group of employers or insurance carriers in any one city where the individual system might be too expensive for any one employer.

PROPER PUNISHMENT

A firm hand by the industrial boards in dealing with malingerers is essential. It matters not whether benefits are cut off on the date the employe should have shown his good will and attempted to resume some work upon the physician's advice, or the knowledge that detection of malingering will certainly be punished by the boards or courts—the employe who is faking will fear the consequences. Fear goes a great way to keep people straight who otherwise might be intentional malingerers. This fraud is the meanest of all and should be severely dealt with.

EXPERT DIAGNOSTICIANS

This group would include a well-paid medical commissioner, skilled in industrial medicine and surgery and in the detection of malingering, and well-paid chief medical examiners.

Employes may have their own opinions, but they cannot seem to learn that working, after certain disabilities, will do more for them than medicines or treatment in hastening a cure. The difference between the patient visiting his own doctor and being examined by the commission's expert is that in the former case the patient seeks advice, while in the latter case the patient squeezes symptoms to fit the condition. The former doctor is perhaps biased. The expert is unbiased, and while giving the employe the benefit of the doubt, he is an administrator of justice to all, especially that great class of honest employes who say "I don't want anything for myself. I want a good body and to get back on the job."

The expert should be acquainted with industrial conditions so that his judgment as to a finger injury would be fair to a tailor or watchmaker, while the same injury would be less disabling to a foreman or driver, and the return to work order should accordingly be influenced.

The expert should study the individual and know character. He should know when to agree with dishonest complaints and when not to agree.

He should have a fair knowledge of decisions of State boards and courts in various types of cases, as his questions and the answers thereto may prove of great value to the commission in legally interpreting a malingerer's statement.

Finally, he should have a thorough knowledge of pathology. This is essential to account for many of the symptoms alleged by a malingerer. It is of untold value in the hundreds of tests to check malingerers. That is something of which the malingerer knows nothing. This will stop the testimony of unscrupulous doctors concerning a wonderful pathological condition, purely invented in the hope that the lay members of the

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board will give the patient the benefits.

CONCLUSIONS

In attempting to recognize the disease, investigate the causes, and treat the condition, there has been one point in view—that of returning the sick or injured employes who tend to malinger, to work in the shortest time consistent with good recovery. This saves an economic loss to the employer and protects the honestly-disabled employe, who by reason of his honesty should profit in proportion as the malingerer should suffer. The American spirit is justice for all. Stress has been laid on well-trained industrial surgeons. This is because in my opinion few mistakes could be more serious or do more real harm than to stigmatize an honest man a malingerer. It is possible by proper methods to prove malingering. At the point of doubt the medical commissioner is essential and his opinion should prevail on all medical questions. A number of malingerers get surprisingly well before they will be examined by the chief surgeon or medical commissioner.

Elevator Hazards

By Dana Webster

Safety Inspector, Aetna Life Insurance Company, Indianapolis

Proceedings of the Eighth Annual Safety Congress

THE early type of the safety device was designed to stop the car instantaneously. They served the purpose satisfactorily for slow speed, but were not adequate for the higher speed of 400 to 700 feet per minute. It, therefore, became necessary to provide a safety device that would stop the car with an easy and gradual stop. This is accomplished by the friction clamp safety, which is actuated by a safety speed governor, usually set to trip at 40 per cent above regular speed. This governor will act should the hoist cable break, allowing the car to drop, or should the car overspeed from some defect in the machinery after the governor trips and the car has dropped far enough to take up the clearance of the safety jaws. The jaws are forced hard against the guide rail (like a vise), and the car will continue to slide until the friction is enough to stop the car entirely. The distance the car will slide after the safety takes hold depends upon the load; but the farther the car slides the tighter the safety grips the rail. Usually a car will drop about 6 feet after the governor trips and clamps the governor cable.

OVER-RUNNING OF LIMIT STOP

The machine of all power operated elevators should be equipped with automatic limit stops; that is, a device that will stop the elevator at the top and bottom limit of travel, regardless of the operator.

On drum machines, the automatic limit stop should be built with and made a part of the machine.

On hydraulic elevators, the automatic limit stop should consist of a cut-off valve, either in the to-and-from pipe, or in both the supply and discharge pipe.

On traction type of elevators, the automatic limit stops must be located in the hoistway, and the power cut off by the travel of the car. As there is more or less slippage of the hoist cables on the drive sheave, a machine automatic would not be dependable. In addition to automatic limit stops on electric elevators, there are hoistway limit switches located so that should the car travel a certain distance by the automatic limit stop, the car would open a switch, thus cutting off the power and stopping the machine.

SAFE PROTECTION AT LANDINGS

The early types of passenger elevators—and in fact most elevators up to the present time—are provided with landing doors equipped with a catch located on the inside so that the door

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can only be opened by the operator. The operator, however, in order to make speed—and the public is partly to blame for this—starts the elevator before the door is closed, and quite often the door would not fully close and latch, thus providing a very dangerous condition. Many persons have opened the door when finding it ajar, and, looking in the hoistway, have either fallen or have been knocked down the hoistway by the car and severely injured or killed. I might say right here that statistics show that 85 to 90 per cent of all elevator accidents occur at the landing doors. Therefore, it became necessary to provide the landing doors with a locking device that would prevent the doors from being opened, unless the car was at the landing; also to prevent the car from being removed away from the landing until the landing doors were closed. This is termed the interlocking device, or interlocks for landing doors. While I believe all landing doors of passenger elevators and gates for freight elevators should be equipped with interlocks, I am sorry to say that at the present time only a small percentage of elevators are equipped with this device, although they are becoming more and more in general use.

CABLES

The cables are the most essential parts of the elevator equipment, and their number and size should be equal to the load with a good factor of safety. The sheave should be of ample size and placed in alignment to prevent chafing of the cables on the sides.

Great credit must be given to the manufacturers for the high state of perfection these devices have brought. This fact must be admitted when considering the few accidents on elevators, compared to the large number of passengers carried. Statistics show that 10,000,000 passengers are carried in the Borough of Manhattan daily, and it is said that this number exceeds the number of passengers that ride on all the surface, elevated and subway cars; in other words, more people ride vertically than horizontally.

A great many elevator accidents are not due to faulty design in construction, machinery or safety device, but to the carelessness of the injured party. It, therefore, becomes necessary for the city or State to enact ordinances and laws regulating the construction of elevators, and enforcing their equipment with effective safety devices, in the interest of accident prevention; that is to say—to prevent a person from being injured by his own carelessness, and also by the carelessness of the operator.

ELEVATOR INSPECTION

Are the safety devices kept in proper condition? is one important question. The only way this can be accomplished is by having the elevator regularly inspected by a competent elevator inspector, who should inspect all the different safety devices, machinery, cables, etc., in fact, everything pertaining to the elevator. The landing doors should be tried to determine whether they can be opened from the outside. The car safety device should be tested to be sure that it would actuate and hold the car from falling, should the cable break. The automatic limit stops should be tested so as to be sure the car will not over-run and strike the overhead beams or bumpers. The slack cable device should be tested to be positive the power would be cut off, should the cables slacken. The brake should be examined to be sure there is no slippage. The cables should be examined very carefully for defects, as there is no part of an elevator that requires the exercise of more good judgment than the examination of the cables. It is just as essential that the safety devices and all parts of the elevator be kept in good working order as it is that they should be installed in the first place. After an inspection has been made, the owner should proceed immediately to install safeguards and remedy any defects reported.

The elevator should be oiled and greased regularly by the engineer and looked over carefully for any defects, and not wait for an inspector to make a thorough inspection, and oftentimes the engineer will discover some little defect which if fixed immediately may avoid a serious accident.

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Another feature that I wish to mention is the elimination of mirrors, in fact all glass, from the passenger cars (except the electric light bulbs), not only because of the fact that they are liable to cause injury to passengers by getting broken, but also because of their attraction, which results in passengers failing to notify the operator promptly as to their destination. This necessitates a stop between floors and a trip back to let them off. They also have a tendency to retard the loading and unloading of the cars.

American Society of Safety Engineers

THE regular December meeting of the society was held on Friday evening, December 19, in the committee room of the American Society of Mechanical Engineers' building, 29 West Thirty-ninth street, New York City. About 30 members were present. The meeting was called to order by President Mowery, and the report of the finance committee was presented, showing that the society is gradually accumulating funds. Mr. Smith suggested that additional funds be raised from sources outside the society, from such sources as large industrial and public service companies, because they should be interested in doing anything they can to help developments and experimental work along safety lines. Mr. Smith's suggestion was referred to the executive board as a recommendation for further consideration and action.

The report of the membership committee shows 260 members at this time, with a large number of applications in hand for consideration.

A communication from John A. Dickinson of the Bureau of Standards was presented wherein he recommended David Linquest, chief engineer of the Otis Elevator Company, for honorary membership. The communication was accompanied by specific recommendation with reasons therefor, carrying the signatures of John A. Dickinson, H. W. Mowery, E. D. Hagerty, G. O. Smith, J. G. Shaw and A. S. Regula. The nomination was referred to the executive committee for action.

President Mowery reported on the conference held at the Bureau of Standards in Washington on December 9, which was called for the purpose of discussing industrial safety codes. The society was represented by Messrs. Jensen, Sanford, Mowery, Rausch and Dickinson, and the result of the conference indicated that long strides were taken for co-operation on the part of the safety organizations in this country.

Other communications were presented by the secretary from a number of members of the society on matters of general interest. which indicated an increased interest on the part of the members particularly and the public in general with regard to the field covered by the society's activities.

The meeting then took up the consideration of the proposed code on head and eye protection, and the members entered generally into the discussion. Mr. Regula went over the code by paragraphs, so that each point of importance could be given proper consideration.

Mr. Bradshaw suggested that special reference be made to protection of other persons in rooms with the operators of electric arc welding apparatus, and referred particularly to the necessity for using screens (preferably painted black) where work had to be done in a large open shop. This question also brought up the fact of protection for men above the operator, such as cranemen, who should be protected from the light of the arc, and that wherever possible electric arc welding should be done in a separate room as the best means of protection. Mr. Bradshaw also brought out the fact that carboys of acid should be handled in cradles in order to reduce the danger of splashing in handling.

Mr. Smith suggested an addition to the code covering eye protection where the mechanical processes could not be made safe, by changes in the processes themselves, and stated that such protection should be mandatory.

Mr. Van Horne referred to the necessity for protection in plants doing high pressure bottling, and suggested that a letter be sent to Dr. Stratton of the Bureau of Standards including this suggestion. Mr. Van Horne referred to the protection of the operator doing butt-welding, on account of the flash and occasional arcing in such operations.

Mr. King recommended that goggles and eye glasses should be so designed that the eye lashes of the wearer ought not touch the glasses, as that leads to eye fatigue as well as being uncomfortable.

Mr. Smith discussed the matter of protection for firemen and engineers in boiler rooms on account of the bright light as well as heat, from the furnace or firebox of boilers. For this purpose the protection devices should be of such nature as not to prevent proper inspection, while at the same time protect from the glare of the light.

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There was also considerable general discussion of the effect of wood alcohol fumes on the eyes and lungs as result of inhalation as well as splashing of the liquid itself.

Mr. Bradshaw made known the point that adequate protection of the worker in any hazardous occupation increases the efficiency of the operator, which is, of course, an argument in favor of the establishment of safety devices.

A communication was read from G. L. Berry in regard to the marking of lenses for goggles wherein he referred to the fact that the eye seeks any spot on the lens. Mr. King had samples with marking at the top and on the upper inner quarter of the edges of the lens, and showed by demonstration that markings in these positions, if small and near the edge, cannot be found by the eye even if a deliberate effort was made to do so by the wearer.

Another point that arose during the general discussion was that goggles should not be used over spectacles, but should in all cases be so constructed as to replace the spectacles, also for the particular operator. The secretary was requested to lay this matter also before Dr. Stratton of the Bureau of Standards.

A few additional suggestions were made covering minor changes in the proposed code. The society then proceeded to the consideration of other matters, among which were two communications, one of which was from the National Federation of Construction Industries and the other from the New York Department of Labor.

The president announced the appointment of new committees, covering library and museum and meetings committees. The president also emphasized that there was a misunderstanding as to the qualification for membership and quoted from the constitution covering these details.

After the announcement of the speaker and subject for the January meeting, adjournment was taken.

COMMITTEES APPOINTED

Membership.—J. A. Dickinson, Bureau of Standards, Washington, D. C.; W. L. Fursman, Willys-Morrow Company, Elmira, N. Y.; A. S. Regula, Liberty Mutual Insurance Company, New York; Thomas A. Walsh, Merchants Shipbuilding Company, Harriman, Pa.; Edw. D. Haggerty, Employers Mutual Insurance Company, New York.

Finance.—James G. Shaw, Travelers Insurance Company, New York; George Oliver Smith, H. L. Doherty Company, New York; George T. Fonda, Bethlehem Steel Company, Bethlehem, Pa.; George M. Douglas, American Smelting & Refining Company, New York; G. E. Sanford, General Electric Company, West Lynn, Mass.

State Compensation Laws

DURING 1919 compensation laws were enacted for the first time in the following 4 States: Alabama, Missouri, North Dakota, Tennessee. In 29 States and 1 Territory amendments of more or less importance were made to the compensation laws; they are: California, Colorado, Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Washington, West Virginia, Wisconsin, Wyoming, Porto Rico.

COMPENSATION LAWS NOW IN EFFECT

Workmen's compensation acts are now in force, or enacted and about to go into effect, in the following 42 States and 3 Territories: Alabama, Arizona, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, Alaska, Hawaii, Porto Rico. In addition, there is a Federal law applying to civil employes of the United States Government and of the Panama Canal, the Panama Railroad Company and the Alaska Engineering Commission, besides the soldiers' and sailors' compensation law, the New York elective compensation law and the Philippine law above mentioned.

As yet no compensation law has been enacted in the following 6 States: Arkansas, Florida, Georgia, Mississippi, North Carolina, South Carolina.

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EDITORIAL

"SERGEANTS OF INDUSTRY"

IT was an appropriate phrase that F. F. Morris used in his address, before the New York State Industrial Congress, entitled "How the Foreman Can Win His Men to Safety."

The foreman is undoubtedly a "Sergeant of Industry," and men who served in the big war—and those who did not serve, but who know their Kipling—can understand that, while the captains of industry and the captains of war may command at dress parade or in formal review, it is the good old patient, knowing, experienced sergeant who is the backbone of the army and upon whom devolves the thankless task of making efficient units out of frequently dubious material by teaching them, as Kipling puts it, "to wash behind their ears."

"Washing behind your ears" means a lot. It means a care for details; it means thoroughness; it means self-respect; it means a thousand and one things that make for morale and efficiency.

No man who "washes behind his ears" will be neglectful of his fellows' safety; he will not leave his tools upon a scaffold to be kicked off; he will not turn the steam on when a man is inside of a boiler; he will not throw on the electric current when a man is splicing a cable; he will not pass a defective casting or guess at a micrometer reading.

That sort of workman can be procured only through a good foreman, and the ideal foreman, like the ideal sergeant, doesn't want a commission. He glories in the number of his service stripes, and he regards his captain, with a half-pitying tolerance, as one who is missing half the fun of the work by being too little in contact with it.

Since the war many have realized that actual contact with work brings the most enjoyment.

A young man recently returned to his old concern and, refusing the clerical job he formerly held, said that his father (who incidentally was worth half a million) told him that office help were underpaid fools, and so the young man asked employment in the shop.

That spirit will mean a better source from which to get material for foremen. It will dignify the man in overalls, and it will transfer the glamor and romance from the salesman to the lathe-hand.

An educated man is required to give the right reaction to the appeal of safety engineers. It takes a high type of foreman to influence his force to regard safety as "first always," and with such foremen the results of safety work will increase with a hitherto unknown speed.

FIRE HAZARDS OF ELECTRIC WIRING

To the Editor of Safety Engineering:

SIR: I have just had my house wired for electricity, and the electrical contractors have done something which I think constitutes a fire hazard.

In bringing the wires up from the cellar they encountered a hot air heating flue made of tin pipe, and, whether or not they struck this accidentally, they continued through and carried the electric cable out through the other wall of this flue. The result is that the cable, which is of the non-metallic type, is carried right through the path of the heat from the furnace.

If this cable should ignite, the fire would follow the cable through and beyond the walls of the flue, but even if the cable did not ignite, would not the constant heat to which it is subjected cause a deterioration of the insulation such as to cause or permit a short circuit?

CONSTANT READER.

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Fire Hazard of Nitro-Cellulose Film and Pyroxylin Compounds

By George W. Booth

Chief Engineer, National Board of Fire Underwriters

Proceedings of Fire Marshals' Association of North America

PERHAPS it will not be amiss in considering this subject to begin with a general statement as to the methods of preparation of nitro-cellulose compounds and some of the physical characteristics of the different types of these compounds. The following is a quotation from a statement prepared by an expert connected with one of the well-known companies engaged in the manufacture of these products:

Cellulose, when treated with mixtures of sulphuric and nitric acids under different conditions, forms nitrates of cellulose of varied character, suitable for the different purposes for which they are used. The chief means of distinguishing them is the percentage of nitrogen they contain, which ranges from 10.5 per cent to 13.5 per cent, although the character of the nitrocellulose does not depend entirely upon its per cent of nitrogen.

Some of the principal types are:

High-grade guncotton, containing 13.3 per cent to 13.7 per cent of nitrogen, which is soluble in acetone, but insoluble in ether-alcohol and other solvents of the lower nitrates.

Pyronitrocellulose, with a standard nitrogen content of 12.6 per cent, the base of most smokeless powders, is soluble in ether-alcohol but not soluble in methyl alcohol, amyl acetate, and other solvents, as are the lower nitrates.

Pyroxylin covers a class of nitrocelluloses containing 10.5 per cent to about 12.0 per cent of nitrogen, and soluble in amyl acetate and wood alcohol. They are the most soluble of all the nitrocelluloses and are used in the various pyroxylin industries.

Varnish cottons or collodion cottons, usually containing 11.5 per cent to 12.0 per cent of nitrogen, are used in making artificial leather, lacquers and enamels, photographic film and other similar purposes.

For pyroxylin plastics, pyroxylins are used containing 10.5 per cent to 11.0 per cent nitrogen, soluble in the same solvents as varnish cottons, but giving solutions of greater viscosity.

The inflammability of cellulose nitrates is dependent on the percentage of nitrogen. Thus, high-grade guncotton is ignited by shock, differing in this respect from any other nitrocellulose. Pyronitrocellulose is a basis of explosives, while the pyroxylins as a class are not considered explosive on account of their low nitration. They decrease in inflammability with the decrease in nitrogen. Thus, tests have been made which show that a film of pyroxylin containing 11.0 per cent of nitrogen burns only 65 per cent as rapidly as a film of pyroxylin containing 12.0 per cent of nitrogen. Pyroxylin plastics containing camphor will burn at a slightly lower speed than a film of straight pyroxylin of the same nitrogen content.

The proper purification of cellulose nitrates is of great importance, and when properly prepared, the compounds have excellent stability. In the early days of the plastic industry this was not clearly understood, with the result that materials came on the market made of improperly stabilized pyroxylin, which decomposed on moderate application of heat and caused frequent fires when carelessly handled. Today in all American plastics the pyroxylin used is very carefully purified, eliminating all traces of free acid and stabilizing the pyroxylin. In the plastic compound there is also included a percentage of stabilizing agent, chiefly urea, which inhibits decomposition of the pyroxylin, in case the material is exposed to acid or to a high temperature.

I shall not attempt to discuss questions relating to the hazard of manufacturing of moving picture film or of pyroxylin compounds. Practically the whole output of both these substances is manufactured in a few large plants which have in most instances fully realized the extent of the hazard involved and have taken more or less adequate precautions to guard against it. In any event, the hazard is not a general one, as is the case in the storage of motion picture films in exchanges and in the use of pyroxylin compounds in the numerous plants throughout the country which use these compounds in various processes of manufacture.

As respects the hazard of nitro-cellulose motion picture film, it is quite generally conceded that at the present time there is very little to be feared from the

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hazard in moving picture theaters, since this hazard has been so well safeguarded by regulations covering the construction of the theaters and the booth in which the machine is installed.

There is, of course, a serious danger arising from the use of nitro-cellulose film in churches, schools and homes, since in few instances are there likely to be proper provisions in the way of a suitably ventilated booth for the motion picture machine.

At the last convention of the National Fire Protection Association, held in Ottawa in May of this year, there was adopted the following resolution:

That the use of motion picture projection machines without a standard booth ventilated to the outside of the building, in churches, schools, clubs, hospitals and homes, be prohibited unless the film used is of the slow-burning type, and that State and municipal laws and ordinances be adopted regulating motion picture exchanges, tending toward the ultimate end that motion picture films of the nitro-cellulose type be replaced when practicable by a slow-burning film.

There was considerable discussion on the last sentence, relating to the substitution of slow-burning film for the nitro-cellulose class. Manufacturers and users of film are agreed that the slow-burning film, as now manufactured, is not a commercial success. Doubtless inventive genius will ultimately develop a slow-burning film which will be a commercial success, but in the meantime there is a tremendous stock of nitro-cellulose film being manufactured and which will continue to be stored and used until it is worn out.

Motion picture exchanges undoubtedly present the most serious conditions in the industry, and that they do constitute a real and very live hazard is proved by the number of fires, usually attended with considerable loss of life, which have occurred in a number of exchanges within the last few years, and by inspections which demonstrate that most exchanges are housed in buildings not fitted for such occupancy and are conducted in an extremely hazardous manner.

The logical thing to do, therefore, seems to be to safeguard the storage and handling of the nitrocellulose film by suitable regulations and to use all our influence towards the adoption and strict enforcement of these regulations by State and city authorities. There have just been issued by the National Board regulations covering the storage and handling of nitro-cellulose film as recommended by the National Fire Protection Association at its last meeting. Acknowledgment should be given for the very great assistance rendered by the Eastman Kodak Company in the preparation of these regulations and for the support pledged to their observance by the National Association of the Motion Picture Industry in a set of resolutions adopted by that association. There should also be mentioned the active campaign now being conducted jointly by the Eastman Kodak Company and the National Association of the Motion Picture Industry to educate the managers of motion picture exchanges throughout the country as to the dangers involved and the best way to meet them. Much good is to be expected from this campaign, but it is doubtful whether the situation can be completely met without the active co-operation of city officials in adopting suitable regulations and providing for their strict enforcement, including frequent, almost constant, inspections of the film exchanges and storages.

In the following discussion I shall draw largely from a pamphlet which will be issued by the National Board of Fire Underwriters in the near future, descriptive of the results of tests made to determine the best methods of storing and protecting nitro-cellulose films:

Nitro-cellulose film is readily combustible and inflammable, and its properties have been the subject of much investigation. One of the interesting characteristics of film is that of decomposition or flameless combustion at a relatively low temperature. Tests show that when subjected to a temperature of 302 deg. F. for 4 minutes, or 320 deg. F. for 1 minute and 43 seconds, decomposition occurs. Again, decomposition frequently changes into combustion and also decomposition is accompanied by evolution of considerable quantities of gases having a variable chemical composition of such nature that gas explosions may or may not be caused. Nitro-cellulose film proper is not an explosive.

For several years no general attempt was made to draft and enforce regulations covering the handling and storage of film in exchanges and other places where large quantities were handled or kept. Various local underwriting organizations compiled regulations which gen-

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erally consisted of an attempt to segregate film from other occupancy and to isolate the actual storage in a vault, it being believed that the principal dangers could be taken care of by reducing the chances of ignition of the film. Thus it became generally recognized that the storage of film should be in vaults or cabinets.

On September 7, 1909, a severe fire and explosion occurred in the Ferguson building, Third avenue, Pittsburgh, in one of the film exchanges. An accurate and careful investigation was made of the fire, which was shown to be caused by the breaking of an electric light bulb in the film vault. The reel of film ignited was thrown out of the vault and the door closed, but other reels remaining in the vault had ignited or were set on fire by electric arcs. The vault had brick walls and a heavy iron door equipped with bolt and combination lock, and contained 185 reels of film, or about 925 pounds, but did not have any opening or vent extending to the outer air, which at this time is recognized as being essential. Decomposition took place in the vault, and the gases were forced around the door cracks into the adjacent room, where they mixed with air and caused a violent explosion.

As part of the investigation of this fire a study was made of decomposition products by the United States Geological Survey, Explosive Division.

The gases of decomposition are a mixture of the ordinary gases, carbon monoxide, carbon dioxide, hydrogen, nitrogen, oxygen, N_2O_4 and N_2O_5, together with some tarry matter. The percentage of these gases is a variable one and depends on the conditions that exist when decomposition takes place. For example: If decomposition occurs under pressure the percentage of carbon monoxide and hydrogen will be high, thus giving a greater probability of an explosive gas mixture with air. On the other hand, under ordinary pressures, the hydrogen and carbon monoxide are present in lower percentages.

During a series of tests made by the Eastman Kodak Company an analysis was made of decomposition products in a film storage vault of one-half standard size with proper vent and automatic sprinkler protection under conditions that duplicate the actual commercial storage and handling of film. The gases analyzed indicated the possibilities of explosive mixtures due to 15 per cent of carbon monoxide present, but attempts to produce such explosions were not successful, the decomposition products burning, however, with intermittent flame. This indicates that gases of decomposition, even though not resulting in explosions, may assist in the spread of fire.

In practically all film fires two general conditions have been observed:

1. That with inadequate or insufficient ventilators gas explosions take place. The explosion which blew out the rear of the second floor of the film exchange fire in Pittsburgh, January 7, 1919, was caused by absolutely inadequate vents. The same condition caused the Ferguson building explosion.

2. That with ventilation or an opportunity for the gases to get to the outer air, the vault with its decomposing film becomes practically a gas generator and evolves large volumes of combustible gas which burns outside the building. The intense fire occurs not inside the building, but outside where ample oxygen is available.

The Ferguson building fire in 1909 and subsequent investigation indicated the necessity of the pressure vent or ventilators for the storage of nitro-cellulose film.

In 1915 a series of experiments was conducted by a sub-committee of the National Fire Protection Association, to determine the proper size of vent in order to keep pressure from building up to such an extent as to force the gases of decomposition through the closed doors. A series of preliminary tests was run to determine the vent area for 100 pounds of film, and it was found that an effective opening of 140 square inches per thousand pounds of film was required. The practical experience of recent fires has made it evident that this size of pressure vent is absolutely necessary.

On April 22, 1915, a test of a vault of 133 cubic feet, and provided with a vent area of 285 square inches, as required by the above rule, was conducted at Leonia Heights, N. J. The object of this test was to determine if undue pressure would be generated during decomposition or burning of the film. There was a total of 1,900 pounds of film in reels, nearly all in separate metal containers; 410 pounds of this was naked or in containers and was laid on the floor, the remainder was on racks. Ignition was made by a spark plug embedded in gasoline soaked waste.

The film vault opening was closed by thin glass in a light wooden sash. Three seconds after the ignition the glass blew out, and at no time did the internal pressure exceed one-half pound per square inch, showing that the vent area was in proper proportion. A shaft of intensely hot flame about 70 feet long and 8 feet in diameter issued from the vent opening of the vault and was maintained for about 90 seconds. This flame was sufficiently hot to spall rocks and indicated the severe damage which would result to adjoining buildings in case the vent opening exposed other structures across the usual street.

Following this test the regulations of the National Board of Fire Underwriters were revised to provide for adequate vent openings. This revision also for the first time recognized the advantages of sprinkler equipments in the extinguishing of this hazardous material.

The marked intensity of the flame from film, the rapidity of burning and the possibilities from gas explosions indicated the need of a thorough investigation of the value and extent of automatic sprinkler equipment in vault storage. This was taken up by the Eastman Kodak Company and a series of experiments and studies made. These tests were primarily to determine whether sufficient sprinkler equipment could be installed in a vault to prevent the destruction of the film and lessen the hazard to other occupancies and adjoining buildings from direct flame

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from the vent and also from the effects of a possible explosion.

A preliminary study of previous fires in material of this nature indicated as a primary consideration that the amount of water used in extinguishing film must be large, due to the necessity of reducing the temperature of the film below the decomposition point, which is very low.

In all cases a vent opening of full size was provided. This window vent opening was kept closed by a string of fusible links at intervals across the vault. Its operation, in all cases, was quick, ranging from 10 to 40 seconds after ignition.

In some of the tests the vault was not subdivided by partitions extending to the floor, as these tests were to study present conditions of storage where partitions are practically never used. Ceiling baffles were installed to prevent the operating head from playing on one which had not yet opened. Based on the preliminary study and the practical possibilities in the installing of the sprinkler heads, it was decided that a ratio of 12 heads to a standard vault of 750 cubic feet was the best arrangement that could be made. The present film storages in the country, if equipped with sprinklers at all, have less than 4 heads, and usually only 2, in a standard size vault.

Of particular interest in the storage of film is the possibility of rekindling fires after sprinklers have been shut off. In one of the tests, conducted between 9 and 10 o'clock in the morning, it was believed that the sprinklers had completely extinguished the fire. Part of the film was removed and then placed back in the vault; 9½ hours after the test the contents of the vault took fire and were consumed, as the sprinklers had been shut off.

The correct procedure, after film fires, is to open and inspect each and every container and separate every bit of film that has been charred badly and decomposed, or been injured in any way.

This recurrence of decomposition after the fire was apparently out was evident in other tests and indicates the need of allowing sprinklers to operate until a hose line can be brought into play.

No tests have been made as to the protection afforded by automatic sprinklers for film on tables in process of operation. Actual fire experience has been that automatic sprinklers, provided with an ample water supply, will control a fire under these conditions, if the amount of film is small. These conclusions may also be deduced from the results of the tests made on vault and cabinet storage. It is evident that the amount of film permitted on tables, counters and other places must be kept to a minimum.

By providing numerous cabinets, all well ventilated and equipped with automatic sprinklers, or installing vaults at points convenient to the receiving and handling of film, it is believed that the hazard of film exchanges and like places will be materially reduced.

The results of the various tests, together with a study of the evidence deduced from the fires of the past, indicate:

1. Automatic sprinkler protection is imperative in preventing loss of life and serious property damage wherever film is handled or stored, and even a substandard system is beneficial.

2. To reduce loss of film to a reasonable figure and the decomposition to a point where the gas cloud does not introduce a severe exposure hazard and there is little liability of an explosion, automatic sprinkler protection must consist of an adequate number of sprinkler heads, at least 12 to a standard vault of 750 cubic feet, and an abundant water supply, capable of supplying water for at least 20 minutes to the full number of heads in a vault and at least one-half of the heads in any other section between fire partitions.

3. That for effective control of film fires by automatic sprinkler it is necessary to insulate masses of film from one another by partitions, and that these partitions are of great value in vault storage.

4. That without adequate ventilation to the outside air, any considerable amount of film will generate conditions introducing a severe life hazard, and a probable heavy property damage from explosion.

5. That arrangement of work rooms and other places where film is handled must be kept practically free of film; all reels to be placed and kept in properly constructed and protected cabinets and vaults when not in actual process of being handled.

6. That the highest order of housekeeping must be exercised; the rooms be kept clean, and fire equipment in good order.

7. That because of the nature of the gases, danger of spread of fire and the rapidity of the burning of film, protection to life requires superior construction in buildings used for storage and handling of film. Of particular need is the protection of all openings, stairways and passage ways, between floors, and the subdividing by fire partitions of the various parts of the film exchange.

8. That ample enclosed stair exits are necessary to prevent loss of life and injury.

9. That in vault construction, it is of primary importance to have door of easy operation, and that it be kept normally closed. As a further provision of safety, to prevent discharge from gases into the room, an automatically closing door should also be provided.

10. That film may be stored in a vault properly ventilated and protected by automatic sprinklers, the entire installation conforming to the National Board regulations, and, if fire occur, it seems reasonably certain that the fire will be controlled by the automatic sprinklers and considerable film will remain uninjured except for water, and that the exposure hazard to surrounding property will be slight.

11. That good housekeeping is of most vital importance in any place where highly inflammable material, such as film, is handled; that full compliance with storage requirements is

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necessary, and that responsibility for these conditions must be placed on a competent employe.

12. That the above features can be obtained only through enactment of suitable laws and ordinances, and their enforcement by the fire department through frequent inspections, preferably each day.

The importance of careful planning and arrangement of storage to suit each particular case, so that the installation conform to the requirements, is apparent.

The general problems relating to the handling and storage of pyroxylin compounds are similar to those of nitrocellulose film; the percentage of nitrogen is lower and the inflammability somewhat less by reason of the thickness and form in which pyroxylin is usually manufactured.

A series of tests has just been completed, with the co-operation of the Pyroxylin Manufacturers Association, to determine the best methods of handling, storing and protecting these products. The results have not yet been fully analyzed, nor regulations completed, but it is expected that this will be accomplished in the next few months. Doubtless the same principles will apply, in different degree, as in the case of nitrocellulose film. That is, we must insist on adequate automatic sprinkler protection, the segregation of the product into quantities not too large for sprinkler control, proper building construction and protection to the communicating openings, and scrupulous attention to housekeeping conditions and cleanliness.

(*Continued from page* 318)

new workmen is due not only to their lack of familiarity with their surroundings, but also to their sense of strangeness, which could be overcome by proper introduction by the foreman. The discussion was led by R. E. Ellis, director of the foremen's training section of the General Electric Company, Schenectady.

"What the Foreman Can Do to Promote Americanization" was the topic of the paper presented by Peter Van Geyt of the Clothing Exchange, Rochester. The discussion by D. D. Fennell and J. J. Blackford closed the day devoted to foremen.

WEDNESDAY SESSION

Wednesday was "The Safety Man's Day" and was in charge of R. M. Little.

C. C. Rausch read the first paper, entitled "The Engineer's Part." It was the answer to the frequently asked question, "What is a safety engineer?" Mr. Rausch stated that "education is the building up in the individual of the means of understanding the world," and he pointed out that safety could not be a separate branch of engineering, but a necessary adjunct to all engineering. A. S. Regula of the Liberty Mutual Insurance Company led the discussion.

Lew R. Palmer, director of safety and personnel, Equitable Life Assurance Society, was assigned the topic "What Constitutes Good Inspection?" His paper provoked comments from attending inspectors as to the sufficiency of the existing force for such work. The discussion was led by J. C. Heckman, superintendent of the Larkin Company, Buffalo, who posed as a "much inspected manufacturer."

Owing to the delay of Western trains by snow, Messrs. Price and Young were late, and the medical papers scheduled for a later session were advanced. These were: "The Surgeon's Part," by Dr. F. M. Furlong, commander, U. S. N. (retired), with a discussion by Dr. P. H. Hourigan of the Larkin Company, "Red Cross Aid," by Dr. Edward R. Hunter, and "The Experience of a Practical First Aid Organization in a Factory," by Dr. De Witt Broughton.

Then a paper was read by C. W. Price, general manager of the National Safety Council, on "Safety Organization and Education." He thought that the greatest results were obtainable through education, and he presented figures to support the claim that appliances could not accomplish big results without the teaching of safety principles. Thomas Stanion, manager of safety and sanitation, Aluminum Castings Company, Cleveland, led the discussion.

Arthur H. Young, manager of indus-

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trial relations, International Harvester Company, Chicago, spoke on "Dividends From Safety and Health in Industry." He assured the audience that the work originally begun by the Illinois Steel Company in 1906 was inspired not by financial but by humanitarian motives, but that now for every dollar spent by any company in accident prevention work the investment was returned with 100 per cent profit. He was asked, "What is the outstanding end of the safety movement?" and he replied, "It is nothing short of the universal brotherhood of man, with safety as the major factor in its consummation." The discussion was opened by John A. Robertson of the Eastman Kodak Company, who told of his early industrial experiences and his education in safety through the receiving of injuries. He also introduced resolutions in memory of John Mitchell, late chairman of the State Industrial Commission, and Mr. Little spoke eloquently of the loss which the State, industry and the world at large had sustained in the death of Mr. Mitchell.

THURSDAY SESSION

Thursday was "Factory Inspectors' Day," in charge of James L. Gernon, first deputy commissioner of the State Industrial Commission. The session was opened with the address of Supervisor M. J. Flanagan, which was a change from the order shown on the program, and which, according to Mr. Gernon, made the sequence of the subjects more logical. Mr. Flanagan's paper was discussed by William M. Rich, M. G. Davie and J. G. Bollinger. Following this came a paper on "Development of Safety Work in Factories," by Inspector Patrick Shea. It was discussed by Messrs. Runyan, Branch and McDowell. Inspector J. F. Tewey delivered an address on "Hazards in Mercantile Industrial Establishments," which was discussed by Messrs. Hertberger, Davidson and Donegan.

In the afternoon the papers consisted of: "Developments in the Removal of Dust, Fumes and Gases," by Inspector Robert Northrup, discussion of which was led by Messrs. Weber, Farrell and Wilson; "Development of the Factory Lighting Inspector," by George C. Ward, the discussion being led by Messrs. Smith, Hoffman and Conlon; and an illustrated address by John L. Train, secretary of the Utica Mutual Insurance Company, entitled "Picture, the Universal Language."

NEXT YEAR'S CONGRESS

Mr. Lynch announced that considerable pressure was being brought to bear upon the commission to induce it to hold next year's congress in another city, and invitations had been received from Rochester, Buffalo and New York. He said that the matter was entirely in the hands of the commission, and that it would make a decision at its meeting on the first Tuesday in February.

EXCELLENT CONDITIONS IN SYRACUSE

The conditions in Syracuse were all that could be asked. The hotel accommodations were excellent and adequate for all who were foresighted enough to reserve in advance, and the auditorium in which the meetings were held possessed excellent acoustics and furnished ample seating room. The whole congress was marked by the evidences of careful planning and able execution, and even the entertainment features were of a nature perfectly in keeping with the purposes of the congress.

The Syracuse Exhibits

"Better and bigger than ever before" was the general verdict on the manufacturers' exhibits at the Fourth New York State Industrial Safety Congress.

Deputy Commissioner Richard J. Cullen deserves a large measure of commendation for the gathering and staging of the display, and he might be pardoned a great deal of self-satisfaction in the way it was done.

The companies represented were too numerous and their offerings too diverse to permit of more than brief mention:

The American Abrasive Metals Company, represented by Messrs. H. Weaver Mowery and Day, showed Feralun in a number of styles and explained its efficiency as a non-slip tread.

The Trumbull Electric Company, represented by Messrs. Dudley and Georges, showed

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the Circle "T" line of safety switches, which is growing rapidly and now includes many times the number of types and sizes shown a year ago.

The H. W. Johns-Manville Company was represented by L. C. Trimble, G. P. Herndl and L. E. Hall. Its exhibit included fire extinguishers, asbestos pipe covering, fire resisting roofing, electric fuses and steam packings.

The Protecto Safety Appliance Company showed double absorbits in full variety, and Mr. Davidson explained their operation in detail.

The Peelle Company showed a model of elevator door. H. E. Peelle was in attendance with full facts and figures for the interested.

Walter Soderling, Inc., had President Soderling on hand to demonstrate his Dustite Respirator and to explain the application of the various styles.

The Mine Safety Appliance Company, represented by Mr. Barnes, showed the Gibbs Self-Contained Oxygen Breathing Apparatus, the Burrell Gas Mask and the Burrell Gas Detector; also many other devices for mine safety uses.

Strauss & Buegeleisen had as a representative Mr. Buegeleisen, who demonstrated many times an hour the non-shatterable qualities of Resistal lenses.

F. A. Hardy & Co., through Messrs. Uttal and Barnes, displayed a large line of goggles, as well as leggins, gloves, gas masks, etc., into which its stock is expanding.

The Oxweld Acetylene Company was represented by Messrs. Banash and Willson, who showed blow pipes and tips for cutting or welding, regulating gauges for acetylene and oxygen tanks and complete description of the low pressure system.

Strong, Kennard & Nutt had an attractive corner in charge of Nelt Barr. The walls were covered with a wide variety of safety signs; two tables were filled with goggles, and gloves and protective clothing were displayed.

The Ambrine Laboratories made continual demonstrations by Miss Bronstein, who discussed with a thorough knowledge of the subject the Ambrine method of the treatment of burns, and illustrated her conversation with convincing photographs.

T. A. Willson & Co. made a fine display of protective and welding goggles, which was in charge of F. M. Rockwell and which attracted continuous interest. William Wortman was also in attendance.

The Foamite Firefoam Company satisfied curiosity by mixing its famous fluids in glass, to show the chemical action which forms their flame quenching foam. William H. Davidson was in charge.

The Julius King Optical Company, represented by Mr. Thomas, displayed particularly the new line of lightweight helmets which mark the company's latest advance in head and eye protection. Goggles also, for welding and for protection from dust and chips, were on display.

The Lungmotor Company had a complete line of lungmotors, in charge of Mr. Jacobson. Constant improvement is being made in the design of these machines, and much interest was shown in them.

The American-La France Fire Engine Company, represented by Messrs. Lovell and Baker, showed, as usual, a wide line of both fire-fighting and safety appliances. New forms of respirators attracted special notice, as did the several styles of carbon tetrachloride and soda and acid extinguishers. La France Yablick masks, goggles and helmets were also shown.

The Safety First Supply Company was out of luck, for, as its sign read, "Inanimate material lost in transit. Animate material on the job." Mr. Boli was the "animate material." He was very much "on the job" and attracted attention to his space by a Bay State "Portalite."

The Aetna Life Insurance Company had C. F. Pierce on hand with its model factory, which showed safety appliances applied and also existing hazards.

The Crouse-Hinds Company showed safety panels, safety switches, safety motor starter switches and headlight.

Other exhibits included: American Mutual Liability Company, John A. Roebling Company, Stromberg Carlson Telephone Company, Utica Mutual Insurance Company (including Victor Animatograph Company), Prudential Insurance Company, Nicholas Power Company, Metropolitan Life Insurance Company, Irving Iron Works, Chesebro Whitman Company, Norwich Wire Works, F. A. Carlton, McNutt Can Company, Allis Chalmers Company, W. H. Sylvester & Co., Kaustine Company, Sectional Safety Stop Company, J. Livingston & Co., Inc., Holtzer Cabot Electric Company, John Douglas Co., Chemical Toilet Corporation, Hot Flo Faucet Corporation, Shur-Loc Safety Elevator Company, Cleveland Breathing Machine Company, W. P. Hitchcock Company, H. D. Lee Mercantile Company, General Electric Company, Pyrene Company, Square D Company, Miller Safety Guard Company, Hagman Machine Works, Liberty Safety Guard Company, and Graphoscope Company.

The Community Motion Picture Bureau exhibited a number of safety films in the corridor.

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Safety News and Comment

New England Congress

THE First Annual New England Industrial Accident Prevention Congress will be held in the Bancroft Hotel, Worcester, Mass., March 9, 10 and 11. The congress is being organized by the Boston Local Safety Council, of which Victor T. Noonan, director of safety for the Bethlehem Shipbuilding Corporation, Ltd., Fore River Plant, Quincy, Mass., is president. The local safety councils of Worcester and Springfield and the Associated Industries of Massachusetts, representing 1,400 members, are co-operating with the Boston Safety Council in planning the congress. Worcester was selected because it is in the center of a large industrial section and can be reached from many points in New England.

President Noonan of the Boston Council, who has charge of the program, announces that the congress will not be a Safety Congress, but will be known as an Accident Prevention Congress, and that only topics dealing directly with industrial accident prevention will be on the program. The congress is intended largely to reach industrial executives, managers and superintendents.

The congress will be formally opened with a luncheon in the Bancroft at noon on Tuesday, March 9. Governor Coolidge and Mayor Sullivan have been invited to open the congress in behalf of the State and the city. C. W. Price, general manager of the National Safety Council, will be a speaker at the luncheon.

Among those invited to speak during the congress are R. M. Little, director of the American Institute of Safety, New York City; M. A. Dow, New York Central Lines, New York City; President Ralph C. Richards of the National Safety Council, Chicago; L. A. DeBlois, president of the Wilmington (Del.) Council; C. L. Close, United States Steel Corporation, New York City; J. W. Powell, vice-president of the Bethlehem Shipbuilding Corporation, Bethlehem, Pa.; Dudley M. Holman, general manager of the United States Mutual Liability Insurance Company, Quincy, Mass., and a number of prominent manufacturers.

During the congress arrangements will be made to hold mass safety meetings in the plants in Worcester.

Saving Lives and Limbs of Employes

AT a recent dinner of the employes of the Haskell & Barker Car Company, Inc., in Michigan City, Ind., the president of that great manufacturing plant, Edward F. Carry, told the men: "If you get into trouble, are in distress, mentally, domestically or financially, come to us and state your case to General Manager Oehm, and practical help will be forthcoming. Not as charity, but because it is your right to ask it."

President Carry put it this way: "When the new crowd took hold of this plant we induced Harry Guilbert to come to Michigan City and establish a new department. At first his ideas on safety were regarded as more or less of a joke and divers and sundry nicknames (among them some expletives) were fastened upon Mr. Guilbert. However, the large attendance indicated that Guilbert's ideas were beginning to bear fruit, as manifested by the general enthusiasm now displayed on the subject of safety."

Mr. Carry went on to say that the company was willing to "go the limit" in spending money in order to make the shop safe and protect its workmen from injury, but that money would be useless unless there was co-operation and "every one took hold of the rope and pulled." He said: "I believe you all have hold of the rope now," and requested that everybody "get behind" the safety movement. "We wish to make this shop 100 per cent safe," he remarked.

An interesting idea was presented by Mr. Carry wherein he said that if the men of an organization co-operated and pulled together toward efficiency it was soon discovered by the competitors of

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that organization, who eagerly "snapped up" its employes whenever they could be had, regardless of whether the competitors had much to do or not.

New York Industrial Commission

THE annual report of the New York State Industrial Commission for the 12 months ended June 30, 1918, was distributed in the last week of December, 1919. It contains reports from the following-named bureaus: Inspection, Workmen's Compensation, Mediation and Arbitration, Statistics and Information, Employment, Industries and Immigration, Industrial Code, Boilers and Explosives, and Legal. The report, as a whole, impresses one with the broad and far reaching functions of the commission, which not only has charge of the sanitary conditions of industrial workshops and the elimination of accident and fire hazards therefrom, but also goes into the personal care of the employe, to the extent of assisting immigrants in adjusting themselves to American conditions of life, and guards against their exploitation at the hands of the unscrupulous.

One inspector's report points out the difficulty in securing proper co-operation from the courts in the enforcement of the labor laws, particularly as they relate to homework done in tenements.

Very complete statistical tables are presented covering inspections by the factory inspectors, the Division of Industrial Hygiene, prosecutions, child labor, illegal hours and prohibited employment of women, etc. Opinions of the Attorney-General construing provisions of labor laws are appended. The whole forms a volume of 261 pages.

Statistics That Startle

FIGURES taken from Government statistics show that every minute 21 persons are injured accidentally; that every 5 minutes 1 person is killed accidentally; that more than 11,000,000 are killed or injured yearly, or about 30,000 each day; that a person is twice as liable to die from accident as from old age.

Soft Coal Storage

THE Factory Insurance Association of Hartford furnishes these suggestions:

Soft coal should preferably be stored in pockets or bins of concrete or incombustible material, roofed over to keep out rain and snow. Space between roof and top of coal should be properly ventilated to avoid danger of explosion of gases.

A cone shaped and elevated bin in which coal is fed in at top and removed at bottom is regarded as the ideal arrangement.

Spontaneous combustion is more to be feared from recently mined coal than from that which has been out of the mine for some time. Certain precautions, as noted below, are, however, necessary to avoid the danger of spontaneous combustion in *all* soft coal storage:

1. Coal should not be piled against, or so as seriously to expose, mill buildings. It should never be piled close to a frame building.
2. Avoid storing near external sources of heat, even though such heat may be moderate.
3. Not more than 500 tons should be placed in a pile, and 25 feet clear space maintained between piles.
4. Piles should not be more than 10 or 12 feet deep, and no part of pile more than 10 feet to an air cooled surface.
5. Avoid alternate wetting and drying, and, if coal is received wet, place it around edges of pile where air can get to it freely and where other coal will not be piled over it.
6. Mingle lump and fine coal as much as possible to avoid lumps forming air passages, which facilitate spread of fire.
7. Avoid admission of air to interior of pile through interstices around piers, timbers, etc.
8. Pipes about 1 inch in diameter should be located vertically in piles, one to each 300 to 400 square feet of area (3 or 4 pipes ordinarily will be satisfactory for a 500 ton pile); the lower ends of these pipes to be at varying distances from bottom of pile. A thermometer should be lowered into these pipes at weekly intervals to ascertain temperatures existing inside the pile.

Industrial Nurses in Demand

THAT trained nurses are being employed in increasing numbers shows that employers generally are recognizing their services. Previous to 1919, only 66 industrial firms employed trained nurses. Today more than 871 industries have nursing services. The industrial nurse has proved to be a good investment. She is a teacher of hygiene, and health education means prevention of accidents. One neglected cut will show the value of the industrial nurse.

The industrial nurses of the National

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Organization for Public Health Nursing plan to form an Industrial Nursing Section in the National Organization at the meeting in Atlanta next April. The object of this section will be the formulation and maintenance of high standards for nursing service in industry. It is planned to make known to nurses throughout the country the opportunities for education for industrial nurses. Opportunities exist or may be developed in many large centers. The program will be of interest both to industrial nurses and to employers.

Qualified nurses are eligible to membership. Employers are eligible to corporate membership. Associations of employers, of employers and workers, or of employes, are eligible to corporate membership.

All industrial nurses are urged to attend the Atlanta meeting and employers of industrial nurses are urged to send nurse representatives. If the nurse becomes an active member, she will have a vote. In any case, she will learn what other industrial nurses are doing and she will return to her duties with renewed energy and inspiration.

Death in Gasoline Tank

JAMES S. CUNNINGHAM, Denver, one of the rescuers of the Bureau of Mines attached to Mine Safety Car No. 2, met death in a storage gasoline tank at Trinidad, Col., August 25. It is thought that, while attempting to connect some pipe fittings in the bottom of the tank, his half-hour oxygen breathing apparatus touched the gasoline in the bottom of the tank, the rubber in the breathing bag dissolving in the gasoline and allowing the fumes to enter the apparatus. When taken from the tank he was dead.

Commenting on the cause of the fatal accident, George S. Rice, Chief Mining Engineer of the Bureau, said:

"The accident brings out strikingly the serious risk, not previously understood, that is undertaken when a gasoline tank is entered using the ordinary breathing apparatus in which rubber has been an essential part of the apparatus. As the necessity to enter a partly filled tank to make repairs arises not only on shore but also aboard ship, the Bureau of Mines will make inquiry of the principal refineries and wherever storage tanks are used regarding the frequency with which such conditions are met, in order to establish the importance or otherwise of the development of a type of apparatus which does not use rubber parts."

Cunningham is the fifth employe of the Bureau of Mines to lose his life in work of this general character.

Chairs for Women Workers

THE National Safety Council has issued a special bulletin regarding the use of chairs to reduce fatigue, especially for women workers:

The day of the ordinary wooden chair and of stools without backs as a part of modern factory equipment is past. Factory managers and the manufacturers of factory chairs know that a chair, to have utility, must be adjustable, so that it can be more nearly physiologically correct. During the last few years the manufacturers of factory equipment have given some consideration to the things that make a factory chair desirable from the standpoint of physical comfort. Chairs should support the part of the body receiving the greatest strain from the work. The legs of the chair should be adjustable as to length, to suit the height of the user. A back rest which can be raised or lowered is generally desirable.

For certain operations the factory chair must be high. Under such conditions a suitable foot rest should be provided. In most cases the foot rest should preferably be attached to the work table, rather than to the chair. It should be large enough, and placed in such a way that the operative may be seated in a normal position.

When the work requires constant standing, chairs should be available for use during lulls in the day's work, and the employes should be encouraged to use them. Wherever possible, it is well to arrange the work so that the operative may stand part of the time and sit part of the time. Change of position appears to decrease fatigue and increase production.

Fracture Cases Are Costly

THE compensation department of an insurance company says that its experience shows fracture cases to be one of the most costly types it has to handle. This is because of failure, in many cases, of the bone to unite properly, either because of the physical condition of the injured person or of lack of skilful treatment.

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"The Man On The Job"

The Morale of Safety

MORALE.—State of mind with reference to confidence, courage, zeal and the like, especially of a number of persons associated in some dangerous enterprise, as soldiers in war.—*Standard Dictionary.*

SAFETY ENGINEERING offers each month one First Prize and one Second Prize for Articles relating to Industrial Accident Prevention. The first prize is $5.00, the second prize one year's subscription to SAFETY ENGINEERING. In case of a tie, the full amount of the prize will be paid to each tied contestant.

No. 412 ALL INDUSTRIES—If you do not believe — You — The Man on the Job—What's the use of wasting one single drop of your precious gray matter on this new fangled fad, "Safety First"? It's a joke, a farce; all bunkum; softens your hide; makes a mollycoddle of you, and hinders production. That's what it does and more. It wasn't taught in your school, and you are as good a man at 20, 30, 40 and 50 years, as you ever were. Anyhow you are too old to change your ways. Be a sport and enjoy the fun. You couldn't think of cutting out those little things which make your job so interesting. How dull it would be without the fascination of going within a hair's breadth and no more, the thrill of all but missing your grip by the skin of your teeth; the excitement of chasing the golden mirage. No, not today: time enough tomorrow. You are too smart to be caught napping. Let them teach, entreat, warn and guard. It is so easy to close your eyes and ears, and refuse to be convinced. And if you do not *believe,* they can't get you.

But if it should happen that, by the seemingly impossible chance of one in two, you do slip, do not worry. Sympathetic hands will lift you with tender care, will mop the beads of perspiration from your brow and, as you sink into the bottomless pit of despair, sympathy will bolster you. Remember, sympathy is magic, a sure cure, especially when it is mixed with iodine and soothing words as, "It was a pure accident," "Unavoidable," or "Nobody was to blame." And if by chance the aftermath should compel you to rest awhile, then is the fashionable time to begin to think that, after all is said and done, there are none so clever, who can fathom all the pitfalls of any particular line of work, as The Man On The Job, you.

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No. 413 ALL INDUSTRIES.—THE MORALE OF SAFETY.—This is a subject which could be dealt with at length, but a few of the main factors in the morale of safety are: Enthusiasm, a willingness for the work, and good-will, which finally leads us to a higher standard of industrial, social and spiritual efficiency.

When talking with the laborer, the machinist, the office man, or, in fact, anyone, we will find that there is something they are clamoring for; their view is partially obscured. The monetary consideration is not all that is desired, but rather regard as a human, which can be secured by entering on a higher plane of industrial, social and spiritual efficiency: Industrial Efficiency, that the work be performed with a greater degree of love or interest by being fair to everyone; Social Efficiency, that more thought and study be directed to the moral and intellectual side of life; Spiritual Efficiency, that, as we are all a part of the universe, we should eliminate all selfish endeavors, rendering service to our fellow man which will kindle the spark of human kindness or fellowship and bring out the

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good in every one. It would behoove all of us to go a little out of our way to assist the other fellow and not help pull him down.

We should have contact with one another in an honest manner, the higher with the lower on a basis of equality, for we are all in the same boat, pulling on the oars towards the one and final destination, where we shall be judged by the deeds we have performed.

We are entering into what is known as the Uranian Age, or the age of better understanding, which is one of the stages in the process of evolution. A book describing the rules and policies of a company is a good plan, but, after all, there is only one real book, namely, the Book of God, which is a guide for our actions and has stood the test of time.

The spirit of the times is to look for the good in every one; it is there. Play fair with your fellow man. In other words, do unto others as you want to be done by, which is the principle that will maintain the morale in safety and every other undertaking.

Enthusiasm, loyalty, honesty and goodwill are principles which must be imbibed by our every artery and vein and all their ramifications. In fact, these qualities must be a real portion of ourselves.

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No. 414 ALL INDUSTRIES.—CARELESSNESS NOT A CHIEF FACTOR.—In my opinion the safety movement has dwelt unduly upon the carelessness of the workers, and has stressed too little the importance of safe tools, safe machines, safe practices and safe construction. Carelessness and ignorance on the part of workers are undoubtedly responsible for many accidents, but chiefly for accidents of a minor character.

It may be said that if personal carelessness could be entirely eliminated, the effect upon the number of serious accidents would not be great, so long as the structural engineering and organization defects are left unchanged.

Serious and fatal accidents, as appears from the present study, are due primarily to faulty engineering or structural defects, in which the workman has no part. The reduction in fatal and serious accidents has been due to engineering revision of structure and practice. It is in this direction that *real* progress lies.

Although it may not be possible to do away with fatal or serious accidents altogether, it is quite possible to make industry so safe that they will be of exceptional occurrence. I believe, in a broad way, this is true of all industries.

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No. 415 ALL INDUSTRIES.—PROMOTING MORALE IN SAFETY WORK.—How to maintain a high standing of morale as relates to safety among industrial employes is the riddle we all are trying to solve. A novice in the work of accident prevention might think the problem a simple one if he were to read all the literature he could obtain that has been published on the subject, and he might so conclude before finishing the reading of such literature, as it all seems to have a single trend through the same general course. If such a novice were called on to add to the published literature on this subject, probably the contribution would not differ in expression from what has been said by a majority of all the others who made contributions.

Oratory, literature, warnings by bulletins, issuance of safety rules, posting of signs, organizing of committees, payment of bonus, and all other suggested methods will not avail unless the effort put forth is backed by sincerity. Soul-stirring oratory may arouse enthusiasm which is likely to die; literature may furnish instructions but they may be crowded out of mind by matters that compel first attention; lessons taught by bulletins slip out of mind because most of the subjects are of unfrequent occurrence; safety rules lose their influence if not strictly enforced; signs are read but once and are not noticed after situations become familiar; committees think they have exhausted their work and soon lose interest in it, and bonuses, unless distributed on an equitable basis, which properly considers variation in hazard, will usually go to the department favored with low hazard, thus destroying interest in winning the prizes. A combination of

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all known methods is necessary to promote morale in accident prevention work, and the success of these must be measured by the sincerity of those whose work it is to keep the attention of employes centered on them.

Somebody might inquire, what is meant by sincerity? It is following the impulses that are aroused by oratory; putting in practice the teachings of literature; warning by bulletins that are truthful representations of occurrences, not grotesque conceptions whose purpose seems to be to excite mirth; educating by safety rules that describe how operations must be conducted where hazard exists; keeping signs that have been posted in good order, and calling attention to their existence when it is seen a lesson can be implanted; requiring reports from committees, that will reveal how active they are, and, if a bonus is to be paid, having the standing of competitors based on variation from a fixed standard for each, that represents its hazard in comparison with the hazards of the others. In addition, free discussion must be encouraged, good manners and courtesy must be observed, sympathy and attention must be extended to those who make complaints, and all reports of conditions made by employes must get consideration, without prejudice to the one making the report or complaint. Matters must be so dealt with that ill feeling between employes will not be aroused and, above all, employes must be shown that violations of regulations made for safety will arouse displeasure. These things comprise the art of "personal touch," so much talked about and so little understood. We should not expect to get in close personal touch with others by acts that manifestly are patronizing, but to succeed fully our acts must be sincere. We have not succeeded, if we promise to do everything that might be asked of us for votes or other favors, and when we have them tell the persons whose favors we have sought they can now do those things for us.

While there are some persons that never are contented, those that never can become so with proper handling are exceptions to the rule. The morale of employes, as relates to safety and efficiency in producing, is always highest where the highest degree of contentment exists. Therefore, gentlemanly treatment has a strong influence in securing contentment. Foremen should be courteous, even though it sometimes costs effort, and they should use all reasonable means to promote this spirit among subordinates. Exhibition of an earnest desire to improve working conditions and promote the welfare of employes is a long step toward promoting contentment. In addition to the ordinary means for securing contentment, there is none better than assisting employes to acquire stock in the business of the company they are employed by. This can be made a bonus method that any employe can share in, and such drain as it may be on profits is more than regained through increased efficiency.

Prizes for October Articles

First Prize—No. 408. E. W. Cummings, Safety Engineer, The Holt Manufacturing Company, Stockton, Cal.

Second Prize—No. 409. Albert J. Eno, Assistant Safety Inspector, Graton & Knight Manufacturing Company, Worcester, Mass.

Comments by Members of the Committee

I cast my vote for article No. 408. The author has brought out good points which are essential to successful safety engineering. The article is somewhat general, but it is interesting, both from the material and the psychological side of the question.

I know how he felt when told by the manager that his safety expenses were rather high—and then returned to his office to be informed that a man had had his leg broken in four places.

All these situations have to be accepted in a proper spirit, for there are pleasant

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incidents, when serving our fellow man, in knowing that accidents have been reduced, which means a diminution in sadness and suffering among mankind.

Accident prevention work is a real service, and it will advance as we go along, embracing many branches of the great human family. The human race is entering a stage of evolution where it is to learn more of itself, a stepping stone toward higher aims and ideals.

The author of article No. 408 not only gives a description of practical safety devices, but shows also that he has achieved wonderful results. His article, which is clear, logical and forceful, deserves first place.

My vote is in favor of No. 408; in all respects a very good summary of the duties of a safety engineer. Indeed, more than this could be said. If all of us attempt to follow this article, in 1920, as nearly as possible, results will surely be seen.

Safety Work in California

THE Industrial Accident Commission of the State of California summarizes the work of its safety department for the year from July 1, 1918, to June 30, 1919.

General lighting safety orders were issued during the year, and there is now in effect a code that provides the best lighting facilities for employes.

Steam shovel and locomotive crane safety orders, petroleum safety orders and tunnel safety rules were prepared during the fiscal year.

CALIFORNIA STANDARD

As is the custom with the commission, committees of employers, employes and experts prepared the various safety standards for submission to public hearings. The outcome has been satisfactory, because competent men have laid the foundation and have rendered signal service to the people of the State.

The engineering force visited 1,386 places of employment to provide for the safety of 138,149 employes, and also made 182 reinspections and 58 accident investigations.

In addition to making 1,794 internal boiler inspections, 256 being made from the Los Angeles office during the year, 305 air tanks were inspected.

Elevators were inspected to the number of 2,753. Forty-three accidents were investigated, 20 drop tests witnessed and 264 visits made explaining elevator safety requirements. The Los Angeles Board of Mechanical Engineers, working in co-operation with the commission's staff, made 3,373 inspections of elevators.

The electrical engineers made 349 original inspections and 66 reinspections, in addition to investigating 16 accidents due to electrical causes. The revision of the electrical station safety orders and the electrical utilization safety orders was part of the division's activities.

MINES, MILLS, SMELTERS

There were 315 inspections, affecting the safety of approximately 16,000 men employed in mines, mills, smelters, gold dredges, quarries and construction tunnels. Assistance was given the Federal Government in its work against the illegal use of explosives, and the Immigration and Housing Commission was also helped. There was a gratifying reduction in the number of fatal injuries in mines, in spite of war conditions. The standard course in first-aid to the injured has been given 31 times in 9 counties; 322 persons took the complete course and 435 took part of the training. First-aid drills have been sent monthly to the 51 mines in the State where first-aid training has been given. Three serious mine disasters necessitated fire fighting operations and subsequent recovery and safety work.

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Literature of Safety

Accident Prevention, Fire Prevention, Hygiene, Sanitation, Miscellaneous

INDUSTRIAL MEDICINE AND SURGERY. By Harry E. Mock, B. S., M. D., F. A. C. S. Philadelphia, W. B. Saunders Company. 846p.

This book is a veritable encyclopedia on all matters pertaining to industrial health and welfare. It is divided into six parts: (1) Industrial Health Service; (2) Prevention; (3) Industrial Medicine; (4) Industrial Surgery; (5) Compensation Insurance, Medico-legal Aspects; (6) Reconstruction.

Not only is the treatment from the medical point of view, but also from the social in its broadest meaning. The information contained in the volume has been gathered by Dr. Mock during his many years' experience as surgeon of Sears-Roebuck & Co., and also as Professor of Industrial Medicine and Surgery at Rush Medical College, Chicago. He writes with authority and with a high regard for his profession. He says: "A comprehensive system of the supervision of the health of employes must include every branch of preventative medicine and surgery and of remedial medicine and surgery as well as industrial hygiene and sanitation."

The many other activities closely related to the health and welfare of employes have brought about the creation of the Employes' Service Departments, which co-ordinate all these activities, namely, the sanitation, safety, medicinal, nursing and the personnel departments. In at least three large corporations these have been placed under the direction of the chief of the medical staff.

A part of the book is devoted to health hazards and accident prevention. Chapters on the re-education and reclamation of the disabled are included, and also a very full bibliography on subjects treated of in the book from 1916 to 1919. The book, no doubt, will rank with the few others on this subject, as Dr. Gilman-Thompson's, Oliver's and Kober and Hanson, and has brought material to be found in these up to date and made later discoveries available.

WORKS COUNCILS IN THE UNITED STATES. Research Report Number 21. October, 1919. Boston, National Industrial Conference Board.

This report is a resume of the history and methods of works councils in the United States. It describes various forms of organization methods of procedure, functions, and sums up results in a few of the plants where shop committees have been most active. The appendix contains a list of industrial concerns having a form of employes' representation up to August 1, 1919, and also a fairly complete bibliography on the subject.

METAL MINE ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1917. United States Bureau of Mines. Technical Paper 224.

Omitting the North Butte mine catastrophe, in which 161 men were killed, the fatality rate for 1917 was 3.60 per 1,000 three hundred day workers. Including the catastrophe, the rate was 4.44, as compared to 3.62 per 1,000 three hundred day workers for 1916. The non-fatal accident rate was 240.87, in comparison to 250.64 for 1916. The following comparison taken from the coal-mine fatalities of 1918 shows the number killed per 1,000 three hundred day workers in various classes of mines:

	Rate	No. Killed	Total Men Employed
Coal Mines	4.25	2,696	757,317
Metal Mines.....	4.44	852	200,579
Quarries	1.83	131	82,290

MISCELLANEOUS

The Norton Company, Worcester, Mass., has published two bulletins, *Health Bulletin* and *Safety Bulletin*. The information has been gathered from numerous circulars issued by the firm since 1912 and is now being issued in a convenient, compact form for its employes or any other persons interested.

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Recent Fires and Their Lessons

Special Reports to "Safety Engineering"

Perusal of reports of fires as the following, from official sources, will explain why the losses of property and of life by fires are heavy. Poor construction is indicated frequently. Lack of precautions in providing safety exits is common. It is not unusual for fire departments to be handicapped by delayed alarms, lack of water, obstructed streets, etc. Private fire protection is neglected in numerous cases. Automatic fire alarm systems, of approved type and properly inspected, that detect fires when they begin, perform a most valuable service in preventing heavy loss by fire and in saving lives.

APARTMENT HOUSES

October 12, 1919. Reading, Pa. Fifth and Bingham streets. Drug store and apartment house. First floor of 3-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, boiler explosion. Alarm, still. Private fire apparatus, none. Persons in building, 12. Means of escape, fire escape. Value of building and contents, $20,000. Property loss, not reported to SAFETY ENGINEERING.

BAKERIES AND CANDY FACTORIES

October 20, 1919. Worcester, Mass. 144-146 Front street. Candy manufactory. One 1-story building damaged. Walls, wood. Floor, wood. Roof, wood. Cause, heater. Discovered at about 9:40 p. m. Alarm, fire alarm system. Duration, one-half hour. Fire was favored; old building. Private fire apparatus, none. Persons in building, few. Means of escape, front and rear doors. Value of building and contents, $75,000. Property loss, $15,000.

CHURCHES

October 20, 1919. Albany, N. Y. Sacred Heart Church. Walter and North 2d streets. One 1-story and basement building damaged. Walls, brick. Floors, wood. Roof, wood and slate. Fire started under basement stairs. Discovered by passerby at about 11:48 p. m. Alarm, station 525. Duration, about 1 hour. Confined to basement. Private fire apparatus, none. Value of building and contents, $75,000. Property loss, $8,000.

September 29. 1919. Alameda, Cal. St. Joseph's Catholic Church. Southwest corner of Chestnut street and San Antonio avenue. One 2-story building destroyed. Walls, wood. Floors, wood. Roof, wood. Fire started in vestry room. Discovered by person in street at about 1:02 a. m. Alarm, telephone. Duration, 2½ hours. Confined to building. Fire was favored; all wood construction; large air space in auditorium. Firemen handicapped by alarm being 'phoned in instead of turning in street box. Private fire apparatus, two 3-gallon extinguishers; none used. Value of building and contents, $48,000. Property loss, total. The fire chief reports: "Within 25 feet of the church was the Catholic Convent, a 3-story frame structure, and three streams were immediately placed in service and saved the building. Three other streams were played on the church, but with no hope of saving it, as the heat was terrific."

COAL AND LUMBER YARDS

October 22, 1919. Detroit, Mich. J. A. McIvor Lumber Company and F. M. Sibley Lumber Company. 2825-2831 Grand River avenue. Lumber yard. One 1-story and one 2-story building damaged. Walls, wood. Floors, wood. Roofs, wood. Cause, overheated furnace in Sibley plant. Fire started in furnace room in rear of office. Discovered by employe at about 11:15 p. m. Alarm, telegraph. Duration, 16 hours. Confined to lumber yards. Fire was favored by frame construction. Private fire apparatus, none. Person in building, 1. Value of buildings and contents and property loss, not reported to SAFETY ENGINEERING.

October 22, 1919. Kansas City, Mo. F. E. Ransom Coal & Grain Company. 3010-3028 East 18th street. Coal and feed. Two 4-story buildings destroyed. Walls, iron clad. Cause, spontaneous combustion. Fire started in coal elevator. Discovered by watchman at about 4:38 p. m. Alarm, telephone. Duration, 6 hours. Stopped at adjoining building. Private fire apparatus, none. Value of buildings and contents. $30,000. Property loss, not reported to SAFETY ENGINEERING.

October 14, 1915. Kansas City, Mo. H. F. Tighe & Co. 2116 Walnut street. Coal and feed. One 1-story building destroyed. Walls, iron clad. Floor, wood. Roof, flat. Fire started in east end of building. Discovered at about 6:38 p. m. Alarm, telephone. Duration, 11 hours. Fire was favored by contents of building. Private fire apparatus, none. Value of building and contents, $8,000. Property loss, not reported to SAFETY ENGINEERING.

COTTON GINS

October 8, 1919. Ten miles from St. Matthews, S. C. J. R. Fairey. Farmer. One 1-story and one 2-story building destroyed. Walls, wood. Floors, dirt and wood. Roofs, galvanized iron. Cause, match dropped in cotton. Fire started in gin. Discovered immediately by ginners. Duration, 6 hours. Stopped at boiler room. Fire was retarded on account of metal roof. Firemen handicapped by distance of fire. Private fire apparatus, small rubber hose from pressure tank. Persons in buildings, 6 or 8. Means of escape, doors and windows. Value of buildings and contents, about $21,500. Property loss, not reported to SAFETY ENGINEERING.

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COTTONSEED OIL MILLS

October 20, 1919. Woodlawn, Ala. Union Cotton Oil Company. Fifth avenue and 46th street North. Cottonseed oil. One 1-story building destroyed. Walls, corrugated iron. Floor, wood. Roof, corrugated iron. Fire started in rear tunnel. Discovered by citizen at about 4 a. m. Alarm, telephone. Duration, 2 hours. Confined to building. Private fire apparatus, several hydrants in yard. Value of building and contents, $100,000. Property loss, $60,000.

DWELLINGS, ORDINARY, CITY

October 9, 1919. Louisville, Ky. 307 East Broadway. Dwelling. One 2-story building damaged. Walls, brick. Floors, wood. Roof, tin. Cause, gas explosion. Fire started on first floor. Discovered at about 7:10 p. m. Alarm, Box 185. Duration, 15 minutes. Stopped at place of origin. Private fire apparatus, none. Persons in building, 15. Injured, 1, fatally; 1, slightly. Means of escape, stairways. Value of building and contents, $4,000. Property loss, $600.

DWELLINGS, ORDINARY, COUNTRY

October 8, 1919. Mountain Parks, 25 miles west of Denver, Colo. Wild Rose Lodge, property of Mrs. A. C. Johnson. Chiefly a summer resort. One 2-story building destroyed. Walls, stone. Floors, wood. Roof, wood. Stopped when building was consumed. Fire was favored by construction of building. Private fire apparatus, none. Value of building and contents and property loss, not reported to SAFETY ENGINEERING.

FOUNDRIES AND MACHINE SHOPS

October 8, 1919. Nonantum, Mass. J. J. Healy. 201 California street. Junk and second-hand machinery. One 1½-story building destroyed. Walls, wood. Floors, wood. Roof, wood. Cause, children. Fire started in rear of building. Discovered by neighbors at about 6:35 p. m. Alarm, Box 245. Stopped at place of origin. Fire was favored; building was an old barn. Private fire apparatus, none. Value of building and contents, $5,500. Property loss, not reported to SAFETY ENGINEERING.

October 8, 1919. Tarpon Springs, Fla. Emmanuel Macrenaris. Grand boulevard. Marine ways and machine shop. Two 1-story buildings destroyed. Walls, one wood, one brick. Floors, one wood, one cement. Roofs, one shingles, one galvanized iron. Cause, spark from saw mill. Fire started in small wood building filled with calking oakum. Discovered by calker. Alarm, telephone to fire whistle. Duration, 1 hour. Stopped at brick building. Fire was retarded by construction of building. Private fire apparatus, none. Persons in buildings, 12. Means of escape, doors. Value of buildings and contents and property loss, not reported to SAFETY ENGINEERING.

HOTELS AND LODGING HOUSES

October 8, 1919. Hettinger, N. D. Lafayette Hotel. One 2-story building. Walls, wood. Floors, wood. Roof, rubberoid. Fire started in basement. Discovered by neighbor at about 3:30 a. m. Alarm, telephone. Duration, 2 hours. Fire was favored by construction. Firemen handicapped by lack of water system. Private fire apparatus, chemical engines. Persons in building, 12. Killed, 3. Means of escape, ropes. Value of building and contents, $7,000. Property loss, not reported to SAFETY ENGINEERING. Valuable papers, records and correspondence were lost.

October 1, 1919. Van Buren, Me. Hotel Cyre. Near Canadian end of International Bridge. Two 4-story buildings destroyed. Walls, wood. Floors, wood. Roof, tin. Cause, overheated stove. Fire started in kitchen. Discovered by station agents opposite at about 5 a. m. Alarm, telephone. Duration, about 12 hours. Fire was favored; all wood construction. Private fire apparatus, own private system, but no water works in town. Persons in buildings, 20. Value of buildings and contents, $60,000. Property loss, not reported to SAFETY ENGINEERING.

MANUFACTORIES, MISCELLANEOUS

October 9, 1919. Amsterdam, N. Y. American Broom & Brush Company. 27 Walnut street. Broom and brush mill. Three-story warehouse. Walls, brick. Floors, wood. Roof, slag. Fire started on 3d floor. Discovered by night watchman at about 3 a. m. Alarm, telegraph. Duration, 4 hours. Stopped on same floor where it started. Fire was retarded by construction of building. Private fire apparatus, 4 combination hose trucks, 1 aerial truck. Means of escape, inside stairway. Value of building and contents, $80,000. Property loss, building, $6,000; contents, $45,000. Valuable papers, records and correspondence were protected.

October 4, 1919. Terre Haute, Ind. American Car & Foundry Company. 1033 Crawford street. Manufacture and repair of box cars, coal cars, etc. One 1-story building, 20 to 40 feet high, destroyed. Walls, brick. Floor, wood, concrete. Roof, wooden supports, tin and slate. Fire started in northwest corner of building. Discovered by night watchman at about 11:56 p. m. Alarm, Gamewell box. Duration, 3 hours 30 minutes. Stopped when building was consumed. Fire was favored; building was old and too much wood construction. Firemen handicapped by low pressure. Private fire apparatus, short leads connected to private hydrants, fire barrels, pails and extinguishers. Value of building and contents, $300,000. Property loss, $170,000.

October 3, 1919. Chicago, Ill. Universal Casket Manufacturing Company. 355 Union Park place. One 6-story and basement building damaged. Walls, brick. Floors, wood. Roof, wood. Cause, electric wires. Fire

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started in second floor. Discovered by citizen at about 9:29 p. m. Alarm, box; 2 alarms. Duration, about 2 hours. Stopped at top floor. Fire was retarded because of brick enclosed stairway with iron doors on each floor. Private fire apparatus, none. Means of escape, stairway and fire escape. Value of building and contents, $120,000. Property loss, $8,500. The fire chief reports: "The fire was fought from the inside of the building, from floor to floor, until extinguished. Nine streams were used."

October 2, 1919. Chippewa Falls, Wis. Consolidated Construction & Manufacturing Company. Upper High street. Manufacturing boxes, doors, windows, etc.; sash and door factory. Two 2-story buildings destroyed. Walls, wood. Floors, wood. Roofs, iron. Cause, spontaneous combustion. Fire started near dry kiln. Discovered by neighbor at about 7.20 p. m. Alarm, box. Duration, until 9 o'clock next day. Stopped at adjoining buildings. Fire was favored by construction of buildings. Private fire apparatus, none. Value of buildings and contents, $40,000. Property loss, $40,000.

September 14, 1919. Chicago, Ill. John Berg Manufacturing Company. 5001 South Wells street. Brick. One 2- and 3-story building damaged. Walls, brick. Floors, wood. Roofs, wood, tar paper and gravel. Fire started in base of shaving shoot. Discovered by citizen on 1st floor at about 7.02 p. m. Alarm, telephone. Duration, about 30 minutes. Stopped at 2d floor of 2-story portion and at 3d floor of 3-story portion, about 10 feet from wall. Fire was favored by the iron door between walls being open, causing spread of fire. Private fire apparatus, none. Means of escape, 2 wooden stairways. Value of building, $20,000. Property loss, $1,000.

September 12, 1919. Augusta, Ga. Augusta Bedding Company. Seventh and Adams streets. Bed and mattress manufacturing. Three 1-story buildings destroyed (1 warehouse, 1 workshed, 1 stable). Walls, wood. Floors, wood. Roofs, tin. Fire started in warehouse. Discovered by employe at about 1.30 p. m. Alarm, Gamewell system. Duration, 2½ hours. Stopped at warehouse. Fire was favored by large doors leading from one compartment to the other without shutters. Firemen handicapped by freight train blocking streets 5 to 7 minutes. Persons in building, about 25. Means of escape, doors. Value of buildings and contents, $15,000, estimated. Property loss, $12,000, estimated.

September 11, 1919. Los Angeles, Cal. Pacific Sewer Pipe Company, 306 West 26th avenue. Pottery, brick, sewer pipe, etc. One 2-story building destroyed. Walls, frame. Floors, frame. Cause, floor gas heaters. Fire started in drying rooms. Discovered by workmen at about 12.28 p. m. Alarm, telephone. Stopped when building was destroyed. Fire was favored because building was frame, very dry and hot. Firemen handicapped by low water pressure. Persons in building, workmen. Means of escape, ample. Value of building and contents, $155,000. Property loss, $155,000.

September 6, 1919. St. Louis, Mo. Bayle Food Products Company. 111-115 South Second street. Food products. One 4-story building destroyed. Walls, brick. Floors, wood. Roof, composition. Discovered at about 12.34 a. m. Alarm, box. Duration, 6 hours. Confined to building of origin. Fire was favored because it was a 3d class building. Private fire apparatus, none. Means of escape, fire escape. Value of building and contents, $79,411. Property loss, $61,680.

METAL WORKERS

October 4, 1919. Mingo Junction, Ohio. Carnegie Steel Company. State street. Manufacturing plant. Two 2-story buildings, one totally destroyed, one partially. Walls, stable, brick. Floors, stable, concrete. Roofs, sheet iron. Cause, electric wiring. Fire started in stable. Discovered by watchman at about 5:20 p. m. Alarm, telephone. Duration, 7 hours. Stopped at brick shed used for storing brick. Firemen handicapped by lack of hose; great distance from plug, 1,200 feet for each line. Private fire apparatus, none. Value of buildings and contents, $50,000. Property loss, $50,000.

September 14, 1919. Seattle, Wash. Rex Metal Works. 1304 Seattle boulevard. Metal shop, castings, etc. One 2-story building damaged. Walls, frame. Floors, frame. Roof, frame. Cause, metal converter too close to wall. Fire started in rear of 1st floor. Discovered by watchman at adjoining plant at about 2.50 a. m.; second alarm, 2.57 a. m. Duration, 30 minutes; second alarm precautionary, not a serious fire. Stopped in building of origin. Fire was favored, building being an open wooden shell. Private fire apparatus, none. One person in building. Injured, 1 fireman, slightly. Value of building, $4,000; contents, $7,000. Property loss, building, $2,500; contents, $2,000.

MISCELLANEOUS

September 12, 1919. Oskaloosa, Ia. Kemble Floral Company. Eleventh street and C avenue. Green house. One 1-story building destroyed. Walls, brick and glass. Floor, wood. Roof, gravel and part glass. Cause, spontaneous (coal). Fire started in coal in furnace room. Discovered by foreman in house 60 feet away at about 11 p. m. Alarm, telephone. Duration, 4 hours. Confined to building of origin. Firemen handicapped by water main being only 4 inches. Value of building and contents, $7,000. Property loss, $4,000.

October 1, 1919. Augusta, Ga. Marion S. Jones Company. 825 Calhoun street. Merchandise brokers. One 1-story building damaged. Walls, brick. Floor, wood. Roof, tin. Fire started in compartment where hay and cottonseed hulls were stored. Discovered by employe at about 5.15 p. m. Alarm, Gamewell system. Duration, about 1 hour. Stopped in compartment in which it originated. Fire was retarded by brick partition walls and tin roof.

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Private fire apparatus, none. Means of escape, doors. Property loss, $4,422. Valuable papers, records and correspondence were protected.

PRINTERS AND BOOKBINDERS

September 9, 1919. Los Angeles, Cal. George H. Morrill Company. 432-436 Wall street. Printing. One 3-story building slightly damaged. Walls, brick. Floors, wood. Cause, spontaneous combustion. Discovered at about 1.59 a. m. Alarm, telephone and box. Means of escape, ample. Value of building and contents, not reported to SAFETY ENGINEERING. Property loss, $1,700.

THEATERS AND AMUSEMENT PLACES

October 9, 1919. Shrewsbury, Mass. The White City. Amusement and dance hall. One-story buildings. Walls, wood. Floors, wood. Roofs, wood. Cause, incendiary. Fire started near office. Discovered at about 10.45 p. m. Duration, 3 hours. Stopped after destroying about two-thirds of buildings. Fire was favored, all wood construction. Firemen handicapped by lack of sufficient water. Private fire apparatus, none. Value of buildings and contents, $25,000. Property loss, not reported to SAFETY ENGINEERING.

September 26, 1919. Elwood, Ind. Grand Theater. Anderson and South B streets. Opera House. One 3-story building destroyed. Walls, brick. Floors, wood. Roof, wood. Cause, electric wiring. Fire started on stage. Discovered by tenants in building at about 3 a. m. Alarm, telephone. Duration, 3 hours. Stopped near front of building. Fire was favored, as building was mostly of wooden construction. Private fire apparatus, hose truck and hook and ladder. Persons in building, 7. Means of escape, stairs and fire escape. Value of building and contents, $30,000. Property loss, $2,000.

September 19, 1919. Birmingham, Ala. Best Theater. 2016 Second avenue. Motion pictures. Two-story building. Walls, brick. Floors, wood. Roof, tar and gravel. Fire started in operating room. Discovered by operator at about 3.09 p. m. Alarm, telephone. Duration, 10 minutes. Stopped after damage of 1 film. Private fire apparatus, none. Persons in building, about 200. Means of escape, doors and fire escapes. Value of building and contents, $25,000. Property loss, $50.

WAREHOUSES, PUBLIC STORES

October 9, 1919, Bank of river, Baltimore, Md. Storage for canning company. One 2-story building destroyed. Walls, frame. Floors, frame. Roof, frame. Alarm, telephone. Duration, ½ hour. Stopped when building was consumed. Firemen handicapped by water having to be relayed from one engine to another. Private fire apparatus, none. No further information reported to SAFETY ENGINEERING.

September 16, 1919. Rosalia, Wash. Rosalia Supply Company. Grain warehouse, cleaner and chop mill. Two 1-story buildings destroyed. Walls, frame. Floors, plank. Roof, shingle. Cause, probably defective wiring. Fire started in engine room of cleaner building. Discovered by town night watchman at about 12.30 a. m. Alarm, fire bell. Duration, 1 hour, destroying building; many days in grain piles. Stopped at adjoining property. Fire was favored by construction of building. Firemen handicapped by heat. Private fire apparatus, none. Value of building and contents, $75,000. Property loss, $75,000.

September 14, 1919. Austin, Texas. Cabaniss Warehouse. 406 San Antonio street. Storage for household goods. One 1-story building destroyed. Walls, galvanized iron. Floors, wood. Roof, corrugated iron. Discovered by Mr. Cabaniss, whose residence connects, at about 3 a. m. Alarm, by a policeman. Duration, 1 hour. Stopped when building was consumed. Fire was neither favored nor retarded by construction of building. Firemen handicapped by delay in getting alarm; building was virtually destroyed when department arrived. Private fire apparatus, none. Value of building and contents, $12,000. Property loss, $10,000.

September 7, 1919. Minneapolis, Minn. Minneapolis Sash and Door Company. 926 Central avenue. Sash and door warehouse. One 2-story building destroyed. Walls, wood. Floors, wood. Roof, wood. Fire started outside. Discovered by a neighbor. Alarm, telephone, box. Duration, 4 hours. Stopped after destruction of building. Fire was favored because of wooden construction. Private fire apparatus, none. Value of building and contents, $122,000. Property loss, $122,000.

WOODWORKERS

September 24, 1919. Wapaca, Wis. Wagner & Button. East Fulton street. Saw and planing mill. One 1-story and one 2-story buildings destroyed. Walls, frame. Floors, wood. Roofs, shingle and iron. Discovered at about 10.30 p. m. Alarm, telephone. Duration, 2 hours. Fire was confined to saw and planing mill. Fire was favored by construction, all frame, and a high wind. Private fire apparatus, none. Value of buildings and contents, $8,000. Property loss, $8,000.

KILLED AND INJURED IN FIRES

September 12, 1919. Seattle, Wash. Whiton Hardware Company. Several firemen (slightly).

September 13, 1919. North Kansas City, Mo. Murray Grain Elevator. Fourteen persons killed, 11 injured.

September 14, 1919. Seattle, Wash. Rex Metal Works. One fireman injured slightly.

September 17, 1919. Canton, Ohio. Canton Lumber Company. One person injured.

October 7, 1919. Baltimore, Md. Standard Wholesale Phosphate Company and Standard Acid Works. Two persons injured.

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MATERIALS, APPARATUS, PROCESSES

IN THIS DEPARTMENT APPEAR REVIEW-ARTICLES ON PRODUCTS WHICH CONSERVE LIFE AND PROPERTY. THIS INFORMATION IS SECURED LARGELY FROM MANUFACTURERS. WE ACCEPT NO PAYMENT FOR ITS PUBLICATION

LARGE ELECTRIC MANUFACTURING COMPANY HAS NOTABLE INSTALLATION OF SAFETY APPLIANCES

With more than 4200 machines thoroughly guarded and made safe, and a patrol system for the discovery, investigation and remedy of dangerous elements in the various mechanical and manual operations of their extensive works, the Westinghouse Electric and Manufacturing Company of East Pittsburgh, Pa., is making "No Accidents Today" a prime slogan of their shops.

They have not only placed guards and fenders over dangerous gearing and moving elements, but have provided special tools and implements whereby the liability of accident is greatly reduced. While many of the devices are made by the Westinghouse company for their own use and are not on a commercial basis, the company has no objections to their employment by other concerns. Other devices, however, are manufactured for the market.

PUNCH PRESSES

Typical of the thorough precautions taken, is the system employed with punch presses. The possibilities of injury about an unguarded machine of this type are well known. The careless movement of a foot or the untimely starting of the machine by one hand while the other is under the punch, has resulted in many distressing accidents. Furthermore, injuries have also been caused through the seating stools. Other points that have proved dangerous are the heavy gears and the electrical service switches. After careful study, the Westinghouse engineers have succeeded to a remarkable degree in making their presses almost "foolproof."

On some of the presses is an arrangement of double operating levers whereby both hands must be used in starting the machine. This feature necessitates the removal of the hands from the work, to a position of safety during the operation of the press. The levers are so arranged that the operator cannot resort to the trickery of tying down one lever and working the machine by one hand.

On other presses air is used to eliminate hazard. The punch shops are equipped with a system of vacuum suction and compressed air pipes and taps from these lead to the presses in question. The vacuum piping is connected by a flexible tube to a suction lifter by means of which the work may be properly

Punch Press Guarded and Equipped with Vacuum Lifter

manipulated without the necessity of placing the hands between the dies. These lifters are made in both large and small sizes. The larger lifter enables the operator to stand at the front of the machine and draw the work between the dies from the rear, the operation being made possible by two long wooden handles extending one on each side of the dies, to the rear where they are joined to a large vacuum suction cup, which is applied to the metal. A stopcock on one of the handles turns on the suction when desired, and the vacuum cup adheres tenaciously to the metal. The operator, by means of the

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two handles, then draws the sheet between the dies without finding it necessary to expose his hands to danger.

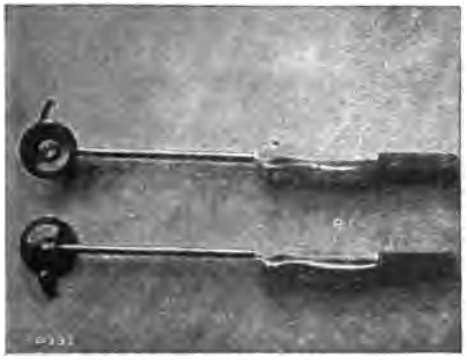
The smaller lifters consist of one or two small leather cups placed at the end of a small metallic tube which is equipped with a handle and a stopcock at the other end. They are light and convenient to handle.

Where the compressed air, instead of the vacuum, system is used, it is so connected to the press that, as the punch is returning from its downward or working stroke, a cam on one of the moving parts engages a stopcock, thereby releasing the compressed air to the work table where it blows upward carrying the work, together with dust and chippings, away from between the dies.

On presses adapted for automatic feeding, the company has placed a device which combines safety with a substantial saving of labor and correspondingly increases production. It consists of a roller feeding device which enables the dies of the press to be completely covered and excluded from contact with the hands, the work being fed through the rolls more quickly than it could be done by hand.

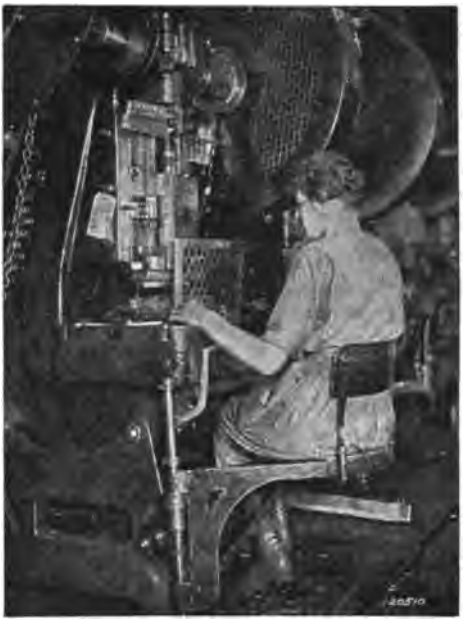
Presses operated by foot power are so equipped that, before the machine can be operated, both hands must be upon a lever in a position removed from between the dies.

All gearing on the presses is completely enclosed in guards.



Vacuum Lifters for Manipulating Work in Dangerous Positions on Punch Presses

It has been found that movable stools for the seating of the operators not only introduce an element of danger but of inefficiency. Provided with a movable stool, there is a tendency for the operator to tilt back or to lean on the stool, thereby incurring the chance not only of a fall, but of more serious accident through his loss of control during the fall. Again, one stool of a given height is not adapted to the use of operators of varying statures. This introduces an item which tends to lower efficiency by handicapping the work of some of the operators To eliminate these difficulties and to save space, the company designed a seat of adjustable height which is fastened to the machine in such a manner that



Punch Press Showing Guards and Adjusted Stool

when in use, it is locked in position so that it will not give when leaned against and cannot be tilted. When not in use, it can be quickly folded together and swung under the machine out of the way.

SHEARING, GRINDING AND BUFFING

Shearing machines are provided both in front and at the rear with guards which allow only sufficient clearances for the work to pass through, thereby preventing an operator from inserting his hands into a position of danger.

Double grinding and buffing wheels are equipped with hoods for the removal of dust and chippings. Collars are also provided for covering the exposed end of shafts when any of the wheels have been removed, thereby preventing the hazard from catching of the clothing and hair.

WOODWORKING MACHINES

The same care and attention to safety is followed on the woodworking machines that is observed elsewhere throughout the shops. All saws are not only covered, but additional precautions are taken to prevent the haphazard flying about of fragments when the saws break, especially in the case of band saws. Rip and crosscut saws are additionally provided with a device which prevents the kicking back of work that is being fed through.

Band saws are completely enclosed at the top, bottom, rear, and as far as possible, at the front. Only a small section necessary for the feeding of the work is left exposed. The guard arrangement is so complete as to reduce to a minimum the danger from breaking of the

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Belt Guard on Planer

saw. The guards are provided with hinges, so that they can be readily opened, allowing convenient access to all parts of the machine.

TOOLS AND MISCELLANEOUS APPLIANCES

The burning and destructive tendency of acids that are accidentally spilled is well known. To reduce this risk, safety jugs are provided consisting of a crockery receptacle strongly encased in a covering of Bakelite which, by its toughness and elasticity, practically eliminates the liability of breakage.

Special solder ladles have proved highly effective in preventing painful burns, by enabling the solder to be poured without likelihood of slopping or spilling over the edges. Two types are used. In one, the spout is extended to the bottom of the ladle and is so arranged that not only is the pouring operation safeguarded, but pure solder, free from scum, is secured. In the other type, a special top is added which also prevents spilling and slopping over.

Solder Ladles Specially Equipped to Prevent Spilling Over the Edges

A noteworthy safety appliance used in connection with electrical testing operations consists of an insulated cable connector which enables two cables to be safely and securely connected without the exposure of live parts. It accomplishes its purpose by means of a clamp which is quickly operated and thoroughly dependable.

Other electrical safeguards comprise enclosed switches and service boxes which greatly reduce the danger from short circuit and accidental contact. A special screw driver insulated with micarta tubing is a valuable adjunct to the equipment of men working on the electrical service lines about the shops.

All window cleaners are provided with safety belts arranged to hook into eyelets in the sill of each window. A man wearing one of these belts, properly connected to the window eyelets, cannot fall even though he should faint or become helpless from other cause. A case occurred not long ago where one of the belts saved the life of a cleaner who was suddenly stricken helpless by an attack of vertigo while working on a fifth story window.

In connection with operations which are dangerous to the eyes, such as grinding, chipping, and work wherein an intense light is thrown off, special protective goggles are provided in eight or ten styles, adapted respectively to the various operations. In the case of intense light, colored glass is employed which reduces the intensity. Workers provided with goggles are required to turn them in at least once every ninety days for sterilization.

Insulated Connections Used in Electrical Testing

For repair and maintenance work about buildings, special scaffolds and ladders are used which embody safety precautions. Rails and toe boards extending around the scaffolds protect the workmen and tools from falling. On stationary ladders, a system of hoopshaped iron fenders starting eight feet from the bottom and spaced at every third rung upward, greatly reduce the hazard of climbing.

PATROL SYSTEM

Realizing that the mere installation of appliances is not sufficient, in itself, fully to accomplish the end sought, the company has a trained organization of safety patrolmen whose duty it is to make a thorough inspection of the equipment of the shops at least once every week. There is one patrolman assigned to each

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shop department and he is chosen from among the best informed workers of that department. He carefully examines the machinery and notes any guards that need repairing or replacing. Also if he observes a workman who, through lack of proper information or training, is doing an operation in a hazardous or careless manner, he points out the danger to the workman. Again, he listens to requests and suggestions for improvements whereby certain operations can be rendered safer. All of his observations are noted down and reported to the proper authority.

Once every month the patrolmen assemble in conference where ideas, suggestions and complaints are submitted and discussed. There is often an instructive address delivered by safety experts of prominent reputation. This procedure keeps the patrolmen thoroughly informed with the safety measures not only of their own extensive shops, but of other industrial establishments as well.

SAFETY AS APPLIED TO GRINDING WHEELS

The Norton Company has recently issued a forty-six page illustrated catalog under the above title. In fact, this catalog might be called a textbook on safe grinding, as it contains a good deal of useful information on the subject.

The precautions taken by the Norton Company in the manufacture of grinding wheels can be pictured from the following extract under the heading "Manufacturer's duty."

"The Norton Company takes every possible precaution during the process of manufacture to produce only such wheels as are free from defects. Wheels are inspected between operations and any which are found to be defective are rejected and broken up.

"After the final manufacturing operation, every wheel, larger than 5 in. diameter, is subjected to a mechanical test of sufficient severity to rupture a wheel which contains any inherent weakness. In this test the wheels are mounted on a spindle and revolved at a speed much higher than the recommended speed. The testing speed is sufficiently high to provide a factor of safety of at least 2½.

"Each testing machine is equipped with a tachometer connected directly to the spindle, which enables the operator to tell the exact speed at which the wheels are revolved.

"A complete record of all wheels tested is kept for reference. Daily affidavits as to the accuracy of these records are sworn to before they are permanently filed. The manufacturing and shipping check must also contain a record of the test, otherwise the Inspection Department will not pass the wheels.

"Immediately after testing, the wheels go to the inspection department where they are given the final inspection before being packed. Every wheel is given a careful and thorough examination by experienced men with eyes trained to detect imperfections of all kinds.

"Beyond this, however, the manufacturer cannot go. It becomes the duty of each user of grinding wheels to determine if wheels have been damaged after leaving the manufacturer and, further, to see that they are kept in good condition."

The table of contents will give the reader an idea of the scope of the subjects taken into consideration.

Introduction — Principles of providing safety for high-speed machinery. Causes of grinding wheel accidents. Prevention of accidents. Providing protection.

The Grinding Wheel—General description. Manufacturer's duty—Care in manufacture; testing; inspection; packing. Customer's duty—Inspection on receipt; storage; handling; inspection before mounting; selection of proper wheel.

The Grinding Machine—Rigidity. Supports. Bearings. Direction of thread on spindles. Length of spindle. Diameter of spindles. Grinding rooms. Dust system.

Mounting — Size of hole in wheel. Flanges. Compressible washers. Tightening nuts. Unusual forms of mounting. Tapered holes.

Operation—Speed. Work rests. Applying work. Truth and balance. Side grinding. Eye protection.

Protection Devices—Description of standard forms. Hoods. Protection flanges. Protection chucks.

Copies may be obtained from the manufacturer.

SAFETY ON THE PACIFIC COAST

The firm of E. D. Bullard, located at 268 Market street, San Francisco, has attained a leading place in the safety movement through a logical development from a single appliance.

Up to 1915 this firm was engaged in acetylene lighting and appliances, especially mine lamps, in which they still have a large business.

In 1915 the Safety Department was added to the business. At that time the movement for Safety First was young in most industries and they specialized at the first in mine safety equipment.

During the Panama-Pacific International Exposition at San Francisco in 1915 they cooperated with the United States Bureau of Mines in "The Mine" exhibit, gaining valuable information and experience during that time; and, at the close of the exposition, retaining one of the First Aid and Mine Rescue experts from "The Mine" exhibit as their safety service manager.

Since that time they have carried safety appliances for mines and have gradually branched out into industrial safety equipment

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of every description. In 1917 they definitely entered the Industrial Safety field in their advertising campaign, and have acquired a large trade in this branch among the growing industries of the West, and an enviable reputation for conservative advice and consulting service in connection with both mine and industrial safety.

They have supplied judges and equipment for all the first aid and mine rescue meets that have taken place in the Pacific Coast region since 1915, and have kept in close touch with the State Industrial Accident Commission since its inauguration. They claim to have furnished 95 per cent of the rescue apparatus and safety equipment in the California mines, and have extended their business in these lines into all the neighboring states.

They aim to widen their scope of usefulness so as to be considered among Western safety engineers as their home consultants and depot for everything in the safety line.

KEEPING UP TO STANDARD

The November issue of "Trumbull Cheer" sustains the pace set by this snappy little house organ and in addition to its general wisdom and well selected clippings, it features the new "Safety" Switch Bulletin No. 3.

If you haven't received your copy of this pocket edition, ask The Trumbull Electric Manufacturing Company, Plainville, Conn., for it.

UNDERWRITERS' LABORATORIES

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examines and tests appliances and devices and enters into contracts with the owners and manufacturers of such appliances and devices, respecting the recommendation thereof to insurance organizations.

The object of Underwriters' Laboratories is to bring to the user the best obtainable opinion on the merits of appliances, devices, machines and materials in respect to life and fire hazards and accident prevention.

The casualty features are carried forward in co-operation with the National Workmen's Compensation Service Bureau.

DEVICES RECENTLY LISTED

CHEMICAL EXTINGUISHER, 1 QUART PUMP TYPE—Childs Co., The, O. J., Submittor, 50 Liberty St., Utica, N. Y.

CHEMICAL EXTINGUISHER, 1 QUART PUMP TYPE—Fire Gun Mfg. Co., Mfr., 115-119 Fourth Ave., New York, N. Y.

CONDUIT BOXES—Adapti Co., The, Mfr., 919-25 West St., Cleveland, Ohio.

CONDUIT BOXES—Electrical Fitttings & Foundry, Ltd., Mfr., 331 King St., West, Toronto, Ont.

ELEVATOR CONTROL APPLIANCE—Andrus, Frank D., Submittor, 214 Moffat Block, Detroit, Mich., Caille Bros. Co., The, Mfr., Detroit, Mich.

FIXTURES—Latham, John H., Mfr., 1009 Hull St., South Richmond, Va.

FIXTURES—McCrosky Tool Corporation, Mfr., Meadville, Pa.

FIXTURE SWITCHES—Bryant Electric Co., The, Mfr., Bridgeport, Conn.

FLASHLIGHT—American Ever Ready Works, Mfr., Long Island City, N. Y.

FLOOR SWEEP—Interstate Chemical Co., Mfr., 616 Market St., San Antonio, Tex.

FUSED ROSETTES, LINK TYPE—Paulding, Inc., John I., Mfr., New Bedford, Mass.

HIGH-PRESSURE GAS GAUGE—Russ Mfg. Co., The, Submittor, West 58th and Walworth Ave., Cleveland, Ohio.

SURFACE SWITCHES—Chelten Electric Co., The, Mfr., 4859-65 Stenton Ave., Philadelphia, Pa.

TWO-WHEELED, "20-GALLON" LOOSE STOPPLE INVERTING-TYPE CHEMICAL FIRE EXTINGUISHER FOR FACTORY AND WAREHOUSE SERVICE—American La France Fire Engine Co., The, Mfr., Elmira, N. Y.

UNDERGROUND STORAGE TANKS— American Welding and Tank Co., Mfr., 121 Florida Ave., Tampa, Fla.

UNDERGROUND STORAGE TANKS—Phillips & Co., H., Mfr., 904-10 Evans St., Cincinnati, Ohio.

UNDERGROUND STORAGE TANKS—Wayne Oil Tank & Pump Co., Mfr., Fort Wayne, Ind.

WELDING BLOWPIPES—Bertschy Mfg. & Engineering Co., Mfr., Omaha, Nebr.

WELDING BLOWPIPES—Prest-O-Lite Co., Inc., Mfr., Indianapolis, Ind.

WELDING BLOWPIPES—Waterhouse Welding Co., Mfr., Pelham St., Boston, Mass.

WELDING AND CUTTING BLOWPIPES—Air Reduction Sales Co., Mfr., 120 Broadway, New York, N. Y.

ELDING AND CUTTING BLOWPIPES—American Boiler Welding Co., Mfr., 342 N. La Salle St., Chicago, Ill.

WELDING AND CUTTING BLOWPIPES—Burdett Oxygen Co., Mfr., 52nd and Santa Fe Aves., Los Angeles, Cal.

WELDING AND CUTTING BLOWPIPES—Davis-Bournonville Co., Mfr., New York, N. Y., and Chicago, Ill.

WELDING AND CUTTING BLOWPIPES—General Welding & Equipment Co., Submittor, 107 Massachusetts Ave., Boston, Mass.

WELDING & CUTTING BLOWPIPE—Henderson-Willis Welding & Cutting Co., The, Mfr., 2305 N. 11th St., St. Louis, Mo.

WELDING AND CUTTING BLOWPIPES—K-G Welding and Cutting Co., Mfr., 556 W. 34th St., New York, N. Y.

WELDING AND CUTTING BLOWPIPES OR TORCHES—Milburn Co., Alexander, The, Mfr., 1420 W. Baltimore St., Baltimore, Md.

WELDING AND CUTTING BLOWPIPES—Oxweld Acetylene Co., Mfr., Newark, N. J., and Chicago, Ill.

WELDING AND CUTTING BLOWPIPES—Superior Oxy-Acetylene Machine Co., Mfr., East High and Canal Sts., Hamilton, O.

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SAFETY ENGINEERING

THE MAGAZINE OF SAFETY

VOL. XXXVIII. No. 1 JULY, 1919 25 CENTS

DOUBLE ABSORBITS

NON-SHATTER EYE PIECES

NO DANGER to the eyes from flying glass, even if cracked by a blow they remain gas tight.

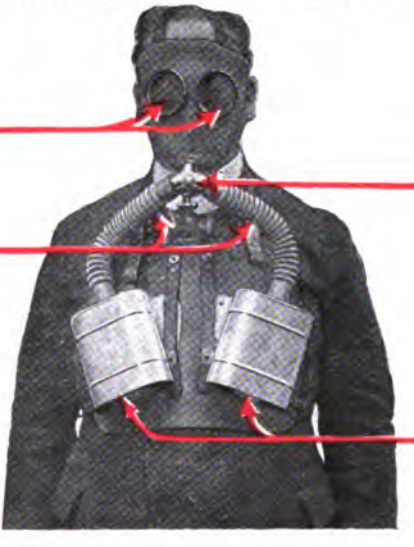
CONTROL VALVE FOR AIR FLOW

NO DANGER of suffocation. The turn of this valve brings a second air supply into service instantly.

The U. S. Army type of Gas Mask improved in many ways chiefly by the addition of a second and independent canister which insures the wearer a reliable air supply if he should be in vitiated air when his first canister becomes exhausted.

ABSORBITS are constructed of the very finest materials and the mechanical features have all been developed to give the utmost safety and comfort to their wearers.

A *Single Type Absorbit*, that is a mask having but one canister, is also made, and this type is sometimes preferred where the gas area is not extensive.



ABSORBITS are particularly well adapted for use in strong ammonia fumes such as are encountered in Refrigerating Plants, and can be supplied with special canisters for use in

Smoke
Chlorine
Nitrous Oxide Gas
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Carbon Tetra Chloride
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Formaldehyde.
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NON-KINKABLE HOSE

NO DANGER of shutting off the air flow, and allows free head motion in any direction.

For years "Protecto" has meant good helmets to thousands, **ABSORBITS** are the latest addition to the Protecto group.

We have issued an illustrated booklet about ABSORBITS, which contains a wonderful picture of a gas attack as seen from an aeroplane.

A postal will bring your copy.

TWO ABSORBIT CANISTERS

NO DANGER of your air supply giving out while in the danger zone. One canister is always in reserve.

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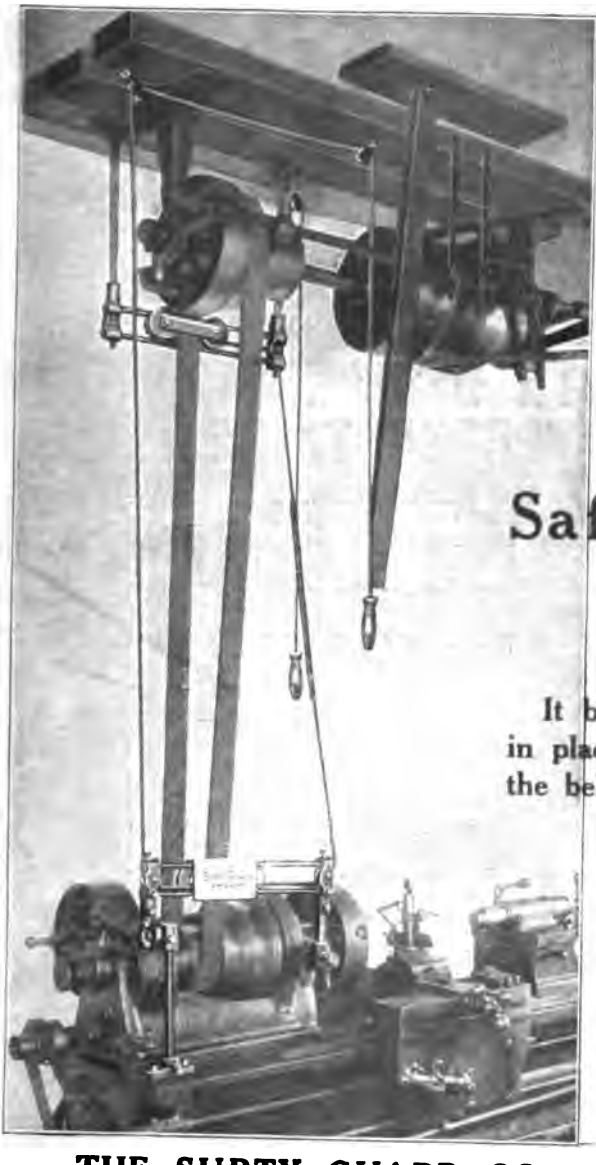
Safety Engineering
Magazine of Safety

VOL. XXXVIII No. 6 DECEMBER, 1919 25 CEI



The Spirit of the TIMES, the Demands of HUMANITY and the Commands of the LAW require that workers be **protected** against loss in Life and Limb.

Shifting Belts the SURTY Way

is

Safe-Sure-Swift

An efficient time-saving **equipment** that pays for itself.

It brings the belt to the worker in place of the worker walking to the belt.

It is awarded the LABEL of the UNDERWRITERS' LABORATORIES because it meets all of their REQUIREMENTS.

For overcoming any **dangerous** condition, consult:

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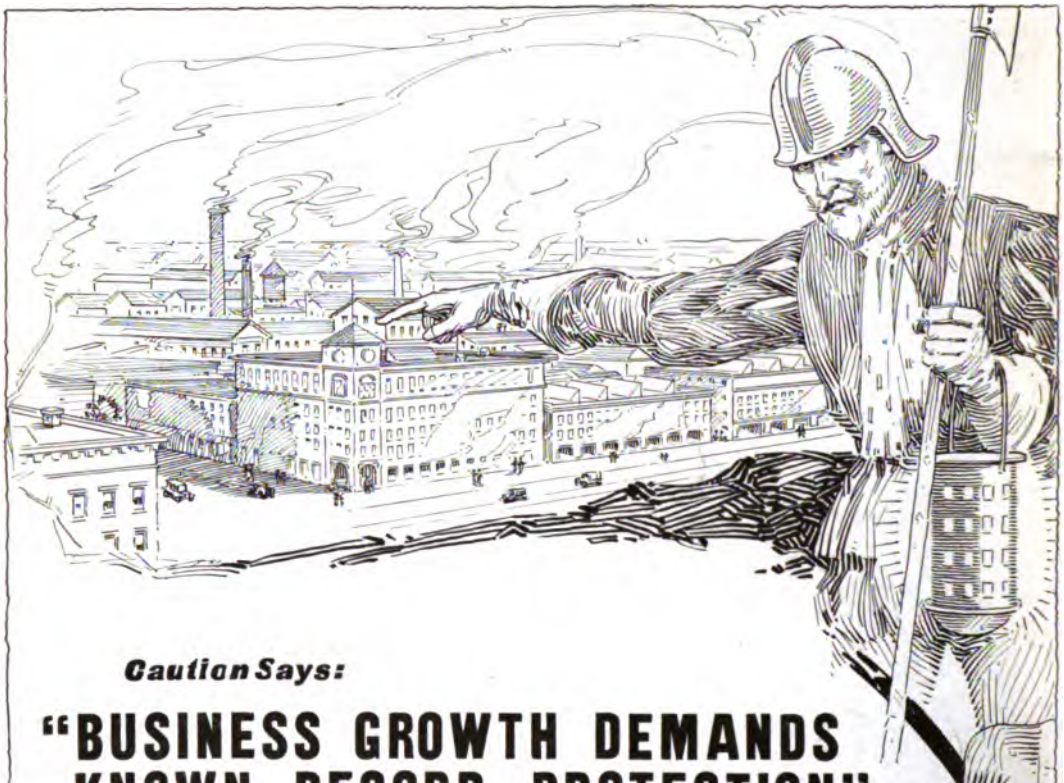

Caution Says:

"BUSINESS GROWTH DEMANDS KNOWN RECORD PROTECTION"

Time has seen great industries grow from small beginnings. It has seen the part played by business records in the attainment of these successes. And it has also seen failure come when records and documents were not adequately safeguarded against the constant menace of fire.

Think what it would mean to you if fire came tonight and destroyed your records, the very life-blood of your business!

THE SAFE-CABINET

"The World's Safest Safe"

THE SAFE-CABINET bears the highest endorsement of The Underwriters' Laboratories, under their new and exacting schedule. It is the only record container that has been awarded their Class "A" and Class "B" labels, signifying four hours and two hours resistance respectively, to terrific and constant heat.

A Service for You

We inspect your premises for fire hazards and advise you as to the most efficient and economical methods of safeguarding and filing your business records.

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THE SAFE-CABINET COMPANY

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Carl M. Hansen, First Vice President. P. R. Bomeisler, Second Vice President.
M. L. Dewsnap, Treasurer, Chas. L. Gleines, Jr., Secretary.

Price, $3 a year. In Canada, $3.50. All other countries, $4.

Entered as Second Class Matter May 19, 1913, at the Post Office at New York, N. Y., Under the Act of March 3, 1879.

Official Publication of the American Society of Safety Engineers

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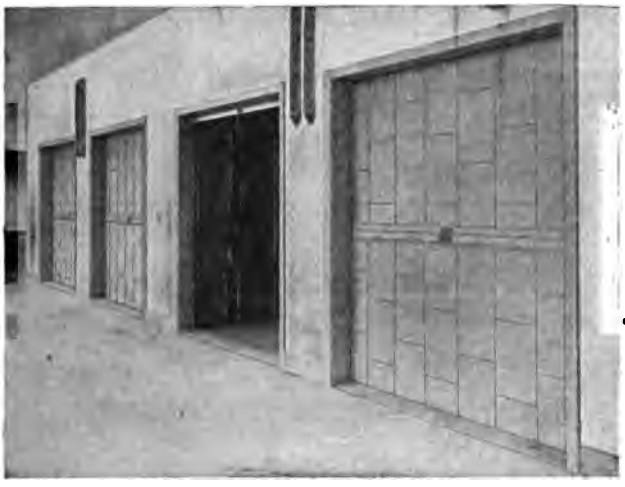

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Don't be satisfied with buying the most resistive types of safety *lenses* you can find. Go further! What if the lens breaks, or is knocked through the lens rim? Genuine safety goggles need even *more* than the best of glass. And here is how the extra protection is obtained—

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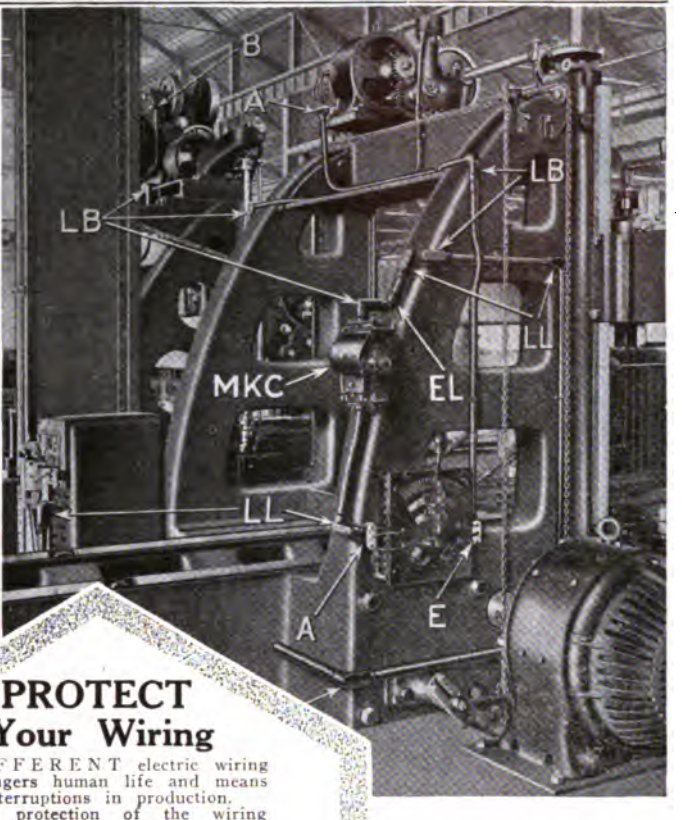

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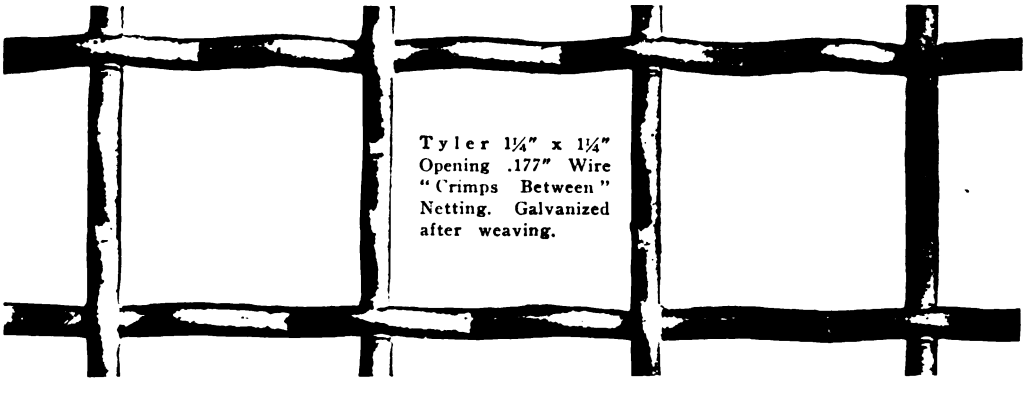

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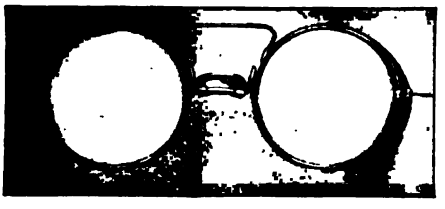

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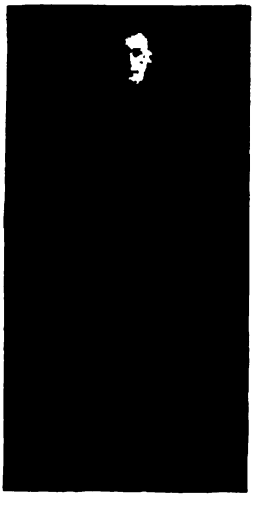

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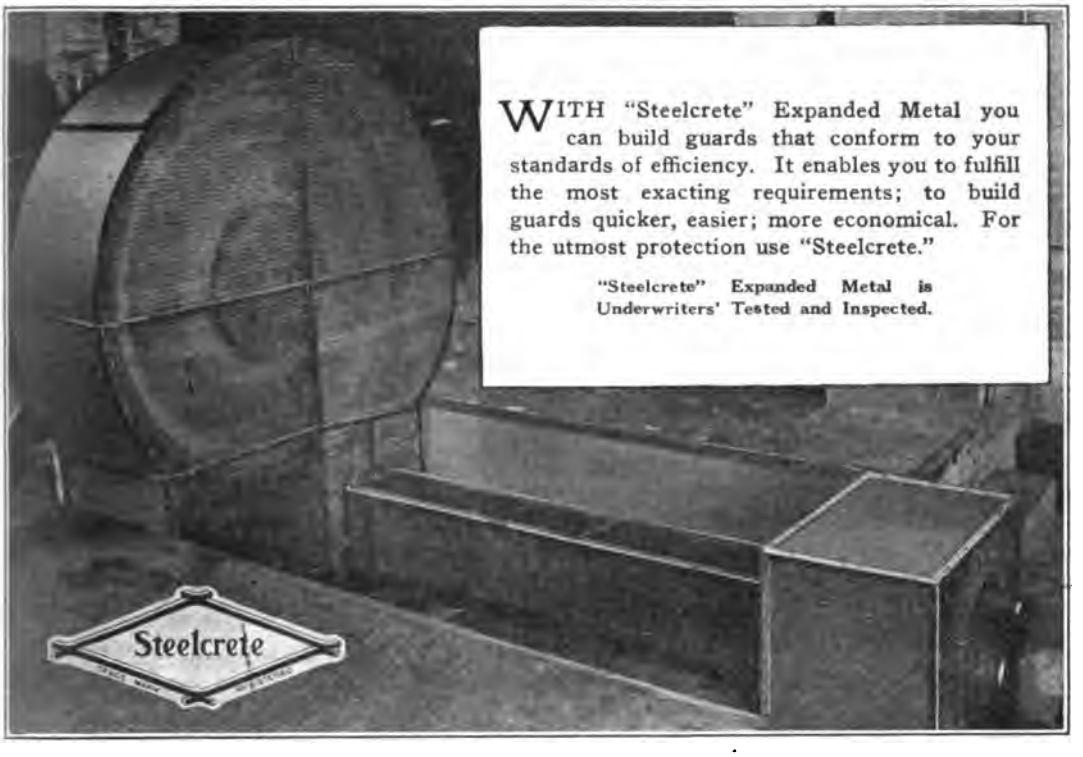
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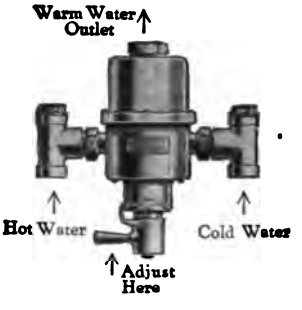

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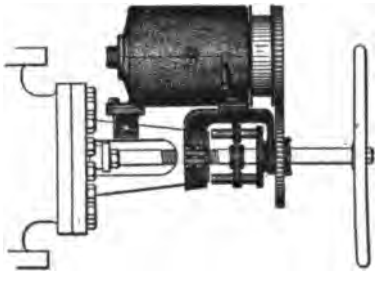

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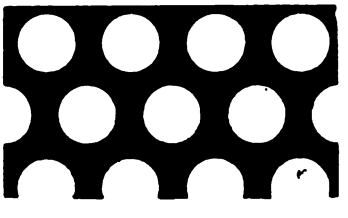

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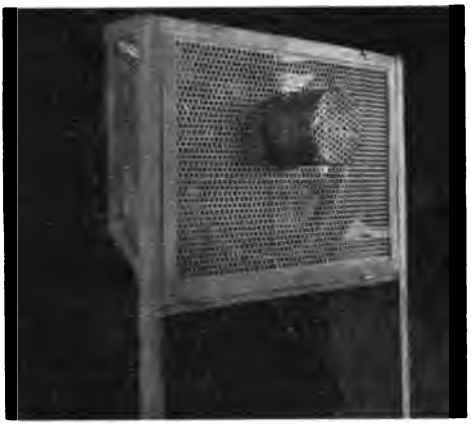

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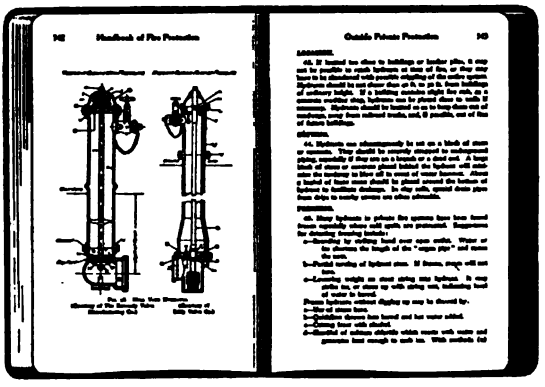

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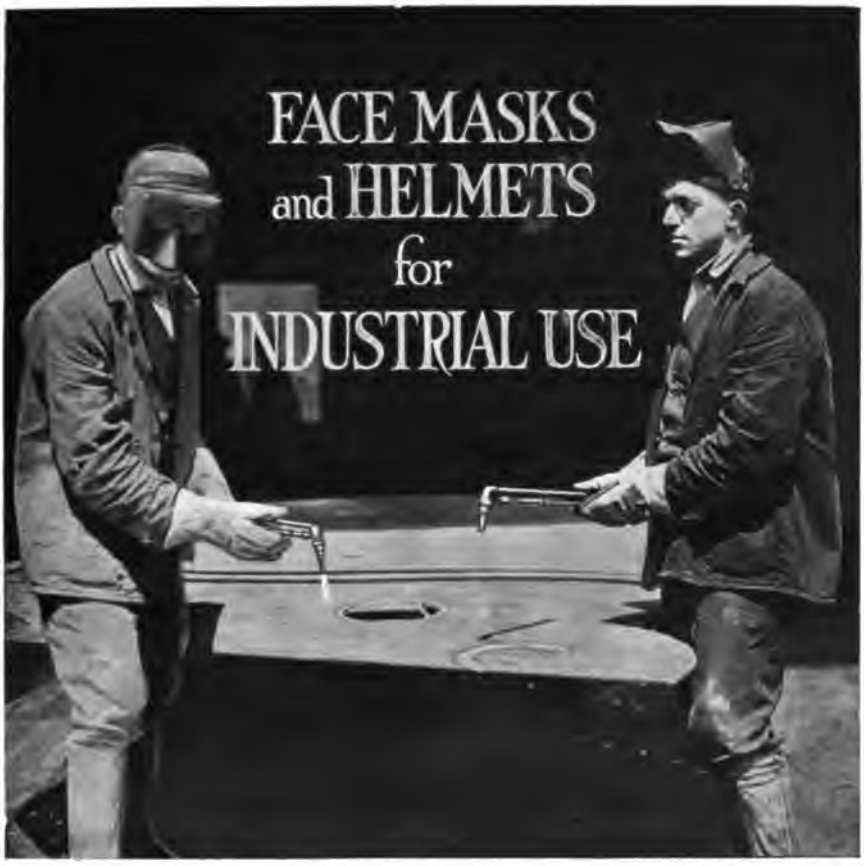

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